INFRASTRUCTURE, GROWTH AND HUMAN DEVELOPMENT IN KERALA

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Abstract

Kerala has a high status in infrastructure development in India and her experiences in social infrastructure development rank her one among many developed countries. This study seeks to analyse the development experiences of Kerala, and to examine what worked behind these experiences. A proposition of a 'chain interaction' between human development and economic growth is suggested whereby the human development Kerala had achieved by means of infrastructure development propelled economic growth (in terms of consumption expenditure) which in turn has led to further human development. Another proposition on an 'invisible hand' *a la* Adam Smith that translates disparate, individual self-interests into coherent social interest also is put up in explaining the development experiences of Kerala. Both these propositions are statistically verified using some innovations in the interpretations of the results and in the methodology of Markov chain ('Markov chain causality'). An attempt is also made to correlate quality and freedom in the context of infrastructure development. Defining development in its truest sense in terms of a duality of availability (including accessibility) *and* quality, we argue that Kerala has in the field of infrastructure achieved only what we call *quasi-capability* (or *q-capability*) *enhancement*, and she is yet to strive for the true development or the *freedom from quasi-freedom*.

An earlier version of this study has served as a background paper for the Kerala Human Development Report 2005.

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1. Introduction

Kerala stands unique among the Indian States with a consistently higher level of human development comparable with that of many advanced countries but with a much lower per capita income. Kerala ranked first among the major States in India in the Human development Index (HDI) at all the three time points of 1981, 1991 and 2001 (Government of Kerala 2002: 414), but her per capita income lagged much behind the all-India average till recently. Implied in this phenomenon is a higher rate of translation efficiency in terms of public action, 'giving higher priority and precedence to the development of these services' (Centre for Development Studies/UN 1975 [2000]: 153) in response to organised public demand. The clear suggestion made by the 1975 CDS study 'that there is much to be said in favour of a pattern of development which gives attention to these minimum essentials of life, particularly if these are interpreted to include items such as educational and health services which help to build up human capital and make important qualitative differences to the whole process of development' (*ibid*.) led to raising this development experience to the status of a 'model'. The model signifies that it is possible 'in less industrialised and urbanised societies' to attain the third stage of demographic transition by means of such social development without the simultaneous 'rise in *per capita* income, urbanisation and industrialisation', unlike in the advanced countries (*ibid*.).

Doubts were soon raised, however, as to the sustainability of such a model. The significant sources of the social development of Kerala were the higher government spending on the related infrastructures in the compelling backdrop of the welfare state policies pursued in the State since the late middle of the 19th century and the huge remittances from the non-resident Keralites from other parts of India and abroad, especially from the Gulf. The feasibility of the continued state financing of social services was brought under fire and fear especially following the fiscal pressure felt all over India since the mid-1980s. The so-called 'fiscal crisis' of the state in general and the consequent liberalisation drives have now assumed a threatening potential for proving that fear true. Similarly, the prospects of continued Gulf remittance being uncertain, that source also remains unreliable. The future of the human development in the State is thus characterised as facing a big question mark (George 1999; Franke and Chasin 1999). Added to this fear of a fall is the soaring educated unemployment seen against a so-called weak economic base in terms of an insignificant industrial sector in the State. It is generally said that Kerala is in the grip of a low investment syndrome thanks to irresistible labour militancy and inadequate economic

infrastructures, for example, power. The former stands to mark a higher stage in the historical development of the economic and political consciousness of the labour, which in-itself is valuable, though Kerala is often unique in the excesses in its instrumental value.[1] Given the ideological and social-cultural tradition of participation through organisation and mobilisation in Kerala (Kannan and Pillai 2003 a), this, however, appears inescapable.

On the other hand, the inadequacy of economic infrastructures felt in the State as a constraint on investment initiatives is generally attributed to budgetary discrimination followed for a long time by the governments against them, as a result of prime 'priority and precedence' being given to the development of the social infrastructures. Ingrained in this is a tendency to view economic infrastructures 'as competitive rather than as complementary demands in development planning' (Centre for Development Studies/UN 1975 [2000]: 153). Thus to the extent that a development planning exercise presupposes such a complementarity condition and to the extent that the state was actuated by a development perspective, infrastructure development in the State in general could not be discriminatory. That some experiences, for example, irrigation and power, however, are contrary to this expectation then warrants an explanation. This study, while analysing the trend behaviour of the infrastructure development in Kerala, examines this aspect also. And it is found that where public action was consistently inadequate and the political economy of corruption rampant, infrastructure development was as good as random, without any definite pattern peculiar to perspective planning. On the other hand, public action, in its cumulative collectivity, consistently stood to ensure positive results in social services through the development of the social as well as the complementary economic infrastructures.

This study is presented in 10 sections, including this introduction. In the next section we discuss the conceptual issues involved in identifying infrastructure capital, often classified into economic and social ones. The significance of infrastructure in economic growth as well as in human development is brought out in the light of a brief review of the relevant literature. We also consider some of the infrastructure indices constructed for the Indian States, in which Kerala occupies a high rank. Section 3 touches upon the development experiences of Kerala, while the next section seeks to examine what worked behind these experiences. A proposition of a 'chain interaction' between human development and economic growth is suggested whereby the human development Kerala had achieved by means of infrastructure development propelled economic growth (in terms of consumption expenditure) which in turn has led to further human development. Another proposition on an 'invisible hand' *a la* Adam Smith that translates disparate, individual self-interests into coherent social interest also is put up in explaining the development experiences of Kerala. Both these propositions are statistically verified using some innovations in the interpretations of the results and in the methodology of Markov chain in sections 7 and 8.

[1] For some case studies in the power sector of Kerala, see Kanna and Pillai (2002: Chapter 5).

Section 5 describes the methodology of the relative indicators and indices of infrastructures used in section 6 that analyses the trend behaviour of infrastructure development in Kerala. Section 9 on a summing up of these results discusses the problems and the prospects, and section 10 seeks to correlate quality and freedom in the context of infrastructure development. Defining development in its truest sense in terms of a duality of availability (including accessibility) *and* quality, we argue that Kerala has in the field of infrastructure achieved only what we call *a-capability enhancement*, and she is yet to strive for the true development or the *freedom of freedom*.

2. Infrastructure Capital

Conceptual Issues

The term infrastructural capital as used in economics, starting with JM Clark's overhead costs and Alfred Marshall's supplementary costs, is overly broad. Referred to also as manufactured capital or manmade capital, it then means any physical means of production or means of protection beyond that which can be gathered or found directly in nature, i.e., beyond natural capital. In this sense, it suggests the value added of a nation relative to the raw natural capital of its ecoregions, e.g., dams, roads, ports, canals, sewers, border posts, etc., as well as firm-specific infrastructure such as factories, private roads, capital equipment, and other such assets. It thus more precisely refers to economic infrastructure.

However, from a public policy point of view, infrastructural capital appears to have more obvious and significant breakdowns. This becomes possible when the term is used, as is today, in a spatial planning context to denote the facilities that support specific land uses and built environment in pursuit of an ultimate public policy of enhancing quality of life. Typically, infrastructure here is divided into three general groups of support systems, which are typically provided by public or private systems or by both, as follows:

1. Transportation modes:
   Roads, Highways, Railroads, Public transport, Airports, River freight, Bike paths, Sidewalks,

2. Public utilities:
   Electricity, Natural gas, Coal delivery, Water supply, Sewers, Telephone service, Radio and Television bandwidth allocation, Cable service.

3. Municipal services:
   Trash collection, Police protection, Fire protection, Flood protection, Postal system, Minting and backing currency (banking).

In addition to economic infrastructure, we also have what is called social (or human) infrastructure. This group includes education, health care, the process of urbanisation, etc.

Social infrastructure services are largely public goods, and thus 'non-rival' (my consumption of them does not reduce yours) and 'non-excludable' (neither you nor I can be prevented from consuming them). However, problems like spatial limitation of many of these services, congestion (too many pupils in a classroom, or too many patients to a doctor) and externalities (we discuss this below) render such services the characteristics of private goods, and we thus have the case of mixed goods. It should be noted that gas, water and electricity are included as industrial sectors in national accounts estimations, while transport, communication, education, health care etc. as service sectors.

It is reported that the composition of economic infrastructure changes significantly with per capita income (Sengupta 1998: 209). For the low-income countries, more of basic services such as water supply, irrigation and roads constitute the dominant components of economic infrastructure, whereas as the economy grows into the middle income stage, share of agriculture declines and more of transport infrastructure is developed. The high-income stage is characterised by significant share of power and telecommunications.

Significance of Infrastructure

Infrastructure contributes to output directly as a measurable final product: according to the *World Development Report* 1994: *Infrastructure for Development* of the World Bank, in terms of value added, share of GDP by the use of infrastructure services, gas, electricity and water accounts for 1.29, 2.24 and 1.87 percent respectively for the low-income, middle-income and high-income countries, and transport and communication for 5.34, 6.78 and 9.46 per cent respectively.

The significance of infrastructure in *economic* development has long been recognised. Most of the studies in this respect seek to capture the (mostly positive and statistically significant) relationship between growth in the stock of infrastructure (measured indirectly through public capital expenditure) and that in aggregate output or productivity. Among the voluminous literature here in the context of the advanced countries (mainly the US) are: Easterly and Rebelo (1993), Munnell (1990, 1992), Aschauer (1989), Deno (1988), Holtz-Eakin (1988), Eberts (1986), and Mera (1973); and for the developing countries, we have: Devarajan, Swaroop, and Zou (1993), and Lee and Anas (1992), and for the panel of both the developed and developing countries: Canning and Fay (1993 a, b), Baffes and Shah (1993), Chhibber (1988), Antle (1983), and Hardy and Hudson (1981). Detailed reviews are available in Jimenez (1995), Gramlich (1994), World Bank (1994, 1991), Kessides (1993), Serven and Solimano (1992), Hulten and Schwab (1991), Fox (1990), and Chhibber and Dailami (1990),

Infrastructure also contributes indirectly, as an intermediate input, by increasing the productivity of other inputs in the production process. It is in this sense Hirschman (1958: 83) characterised infrastructure as "those services without which primary, secondary and tertiary production activities cannot function." It also explains the 'crowding in' of private

investment. While transport, communication and power facilities help increase the productivity of physical capital and land, human capital formation, reflected in improvements in nutrition and health and gains in knowledge and skills, enhances labour productivity. These indirect effects, in the 'endogenous growth' framework, generate externalities that help reap increasing returns to scale leading to accelerated long-run growth, in contrast to the pessimistic neo-classical assumptions of constant returns to scale, diminishing factor returns and exogeneity of the factors themselves. Under these neo-classical conditions, all countries are assumed to converge to the same exogenously determined steady state growth path. It is the failure to recognise the significance of externalities from infrastructure that has led to this empirically challenged hypothesis. Formally, this may be explained as follows:

The 'new growth' production function is given as: $Y_t = A(I_t, t) f(K_t, L_t, R_t, I_t)$, where output ($Y$) is a function of physical capital (K), labour (L), natural resources (R), infrastructure (I) and technical progress (A) with a time variable (t) to allow for other variations in productive efficiency. What distinguishes this function from the neo-classical one is the inclusion of I in $A(.)$, that is, the effect of infrastructure investment on technical progress. Thus, even if $f(.)$, inclusive of I, yields only constant returns to scale (as for the neo-classical formulation), the effect of I on A raises externalities. Instead of the neo-classical exogenous technical progress that comes as manna from heaven, we have here an endogenous, country-specific, one, and this refutes the convergence hypothesis.

It is with human resources[2] formation that most of the theoretical contributions have put up this argument: for example, Romer (1986, 1990), Lucas (1988), Becker *et al.* (1990). It goes without saying that better-nourished and healthier individuals are less prone to illness. Reducing morbidity with improvements in nutrition enhances the physiological and psychological capacities for work, study and play. "[T]here is growing evidence of positive effects of health and nutrition on labour productivity of at least poorer individuals in developing countries." (Behrman 1990: 62). Similarly, "Studies across persons, households, farms, and firms have documented, first generally in the United States and then in many low income countries, strong empirical regularities between educational attainment of populations and their productivity and performance in both market and non-market (home) production activities." (Schultz 1988: 544). Education may stimulate entrepreneurship and the creation of economic opportunities and employment. In addition to these direct effects on one's own labour productivity, human resources development has significant externalities also (contributing to the wellbeing of others). There are evidences that parental education leads to a decline in fertility (Cochrane 1979) and positively influences family health indicators and children's schooling (Behrman 1990). Such

[2] We refrain from using the most current term 'human capital', which expresses the conception of a human being as an economic category; we believe that the casting of workers as components of capital is an extremely alienating thing to do. The term 'human resources' also reduces the human being to an economic category (as 'Natural resources' does Nature); but for want of an alternative and it being less derogatory, we use that term.

externalities also benefit the society as a whole. My getting vaccinated against small pox saves my neighbours also. Literate populations generally stand to ensure a strong civil society to safeguard democratic rights and also to contribute to political stability.

Human resources development not only translates into increased productivity, but also directly leads to enhancement of the quality of life,[3] which refers to the additional utility individuals receive from living longer, feeling better and knowing more and thus from a sense of self-fulfillment. In this light, infrastructure has been regarded as an integral part of development as a system of providing and delivering basic services that people need for everyday life – water, sanitation and other health facilities, modern energy, roads and other aspects of transport, and access to modern information communications technology – and thus helping to achieve development goals. For example, provision of safe drinking water has a direct impact on reducing child mortality and morbidity in general. Providing communities with electricity or natural gas avoids women and children having to spend long hours for fetching firewood, and thus allows them more time for productive activities. In addition to such productive scopes, provision of 'clean energy' stands to ensure a non-hazardous and thus healthy kitchen air for them. In fact it is this latter benefit that is more valued as constituting an element of development, more precisely *human* development. This is in sharp contrast to the mainstream economic approach in terms of '*human capital*' development that enhances the productive potential (Anand and Sen 1994), as illustrated above. It is the intrinsic value rather than the instrumental value of having a long healthy life as well as of being educated and enlightened that defines human development. That is, these achievements are valued in the new approach as *ends* in themselves (*ibid.*).

The UNDP's Human Development Index (HDI) captures the possible essence of human development across the globe in terms of three indicators: health (life expectancy), education (literacy) and standard of living (per capita income adjusted for inequality). It should be noted that the first two are the outcomes of the social infrastructures, complemented by economic ones, and the third, that of economic infrastructure combined with physical capital, labour and human resources. The last input (human resources) in turn is the outcome of the social infrastructure, supported by economic ones. Thus given physical capital and labor, it is infrastructure that determines standard of living. It then follows that HDI in a sense reflects infrastructure development itself and succinctly summarises its significance.

In recognition of the significance of infrastructure development in the overall development of a nation, infrastructure development indices have been constructed and used for regional comparison now especially by most of the developing countries.

[3] "The decisive factors of production in improving the welfare of poor people are not space, energy, and cropland; the decisive factors are the improvement in population quality and advance in knowledge." (Theodore Schultz 1981: 4).

Infrastructure Indices

The *Eleventh Finance Commission Report, 2000* reports State-wise social and economic infrastructure index, sourced from TCA Anant, KL Krishna and UmaDatta Roy Choudhry (1999) *Measuring Inter-State Differentials in Infrastructure*, (given below as AKU Index).

CMIE (2000) *Profiles of Districts*, October, gives another set of Infrastructure Indices for States (and Union Territories) and Districts. Considering "the nature of infrastructural facilities required in a country like India and the availability of published date", CMIE has used the following major infrastructural facilities (along with the weights): energy (24 percent), transport (26 percent), irrigation (20 percent), banking facilities (12 percent) and communications (6 percent) represent economic infrastructure and educational institutions (6 percent) and health facilities (6 percent), social infrastructure (CMIE 2000: 1). In CMIE method, each of the relative infrastructural indicators is normalised using the corresponding indicator for all-India, and the index is obtained as the weighted average of the normalised indicators.

By both the estimates, Kerala has a high infrastructure index, next only to Delhi, Chandigarh, Pondicherry, Punjab, and Goa.

Table 1: Social and Economic Infrastructure Index

	AKU Index		CMIE Index			AKU Index		CMIE Index	
Andhra Pradesh	103.3	(11)	104.01	(15)	Nagaland	76.14	(19)	89.89	(23)
Arunachal Pradesh	69.71	(25)	71.89	(32)	Oriisa	81	(16)	101.45	(18)
Assam	77.72	(17)	104.39	(14)	Punjab	187.57	(2)	171.92	(4)
Bihar	81.33	(15)	91.31	(22)	Rajasthan	75.86	(20)	87.27	(24)
Delhi			730.62	(1)	Sikkim	108.99	(9)	83.01	(28)
Goa	200.57	(1)	171.57	(5)	Tamilnadu	149.1	(4)	145.62	(7)
Gujarat	124.31	(6)	105.33	(13)	Tripura	74.87	(23)	92.85	(20)
Haryana	137.54	(5)	133.12	(8)	Uttar Pradesh	101.23	(12)	112.04	(10)
Himachal Pradesh	95.03	(13)	113.88	(9)	West Bengal	111.25	(8)	102.09	(17)
Jammu & Kashmir	71.46	(24)	92.03	(21)	Andaman & Nicobar			78	(30)
Karnataka	104.88	(10)	106.12	(12)	Chandigarh			625.73	(2)
Kerala	**178.68**	**(3)**	**162.42**	**(6)**	Dadra & Nagar Haveli			96.2	(19)
Madhya Pradesh	76.79	(18)	86.66	(25)	Daman & Diu			103.69	(16)
Maharashtra	112.8	(7)	106.77	(11)	Lakshadweep			82.69	(29)
Manipur	75.39	(22)	83.5	(27)	Pondicherry			252.29	(3)
Meghalaya	75.49	(21)	77.6	(31)	India			100	
Mizoram	82.13	(14)	84.49	(26)					

Note: Figures in brackets are the corresponding ranks.

3. Development Experience of Kerala

In social development, Kerala could successfully tackle the first generation problems such as illiteracy, high infant and maternal mortality rates, high birth rate and low expectation of

life at birth, while her sisters are all still struggling in the trap. According to National Sample Survey data, Kerala is one of the two states (the other being West Bengal) to have achieved an increase in per capita nutritional intake between 1972-73 and 1993-94 (Government of Kerala 2000: 148). With an implicit development perspective, Kerala has initiated and instituted a number of progressive redistribution measures such as land reform, a full-coverage network of public distribution system (PDS), free house sites and house construction support to vulnerable sections. There are as many as 35 social security and welfare schemes for the benefit of the weaker ones in the State.

Kerala has attained high health status in respect of all standard indicators of maternal, infant and child health as well as of the general health of the people, on par with those of many developed nations, thanks to a vast healthcare infrastructure (with complementary economic ones) facilitating access to institutional healthcare. The network of primary and community health centres had extended their services to the remotest of the rural areas in the State, bringing in assuring results even by the 1970s itself. The crude death rate in the early 1970s came down to about 9 per thousand population, and in 1981 to 6.9. The infant mortality rate that reflects the qualitative and quantitative dimensions of the health standard of a community (the infants being the most vulnerable group among the children) was only 61.4 per thousand against 138.35 of all-India in 1968-69. And the life expectation by 1971 rose to 60.57 years for males and 61.16 for females (Paniker and Soman 1984: 36-40). It should be noted that besides the Ayurvedic and other indigenous medical aid widely prevalent traditionally, the European system of medical care was first introduced in Travancore in 1811, and the first hospital opened about six years later (*Travancore Administration Report for 1106 M.E.* (1930-31): 170). According to the Census of 1931, the life expectation in Travancore was 43.8 years for males and 44.55 years for females, comparable with that of 44.8 years for males and 46.5 for females in Japan during 1926-30 (Centre for Development Studies 1975 [2000: 137]). By the 1940s, the death rate in Travancore-Cochin came down to about 15, a level attained in France and Sweden only a decade earlier (Panikar and Soman 1984: 46).

Kerala has also consistently maintained a much higher literacy rate compared with all other major States in India. Her 2001 literacy rate of 90.92 percent stands head and shoulders above the all-India rate of 65.38 percent; her female literacy rate at 87.86 percent and male rate at 94.2 percent are also unique against the national average of 54.16 percent and 75.85 percent respectively. At the turn of the last century (1901), Kerala had a literacy rate of 11.14 percent against an all-India average of 5.35 percent, and the lead has ever since been maintained with increasing gap. Even by 1971, a little over 60 percent of Kerala's population were literate, as against 29 percent of all-India, and she always led all other States in per capita expenditure on education (Menon 2000: 285). Even in the 1950s, education claimed 35.6 percent of the total State government expenditure and in the 1970s, 39.7 percent (Panikar and Soman 1984: 61). Kerala was again fortunate in that the literary movement along with the Press helped develop a non-formal education system with a wide network of libraries and reading rooms and a large number of vernacular newspapers and periodicals. A number of voluntary organisations also emerged, consciously and

conspicuously imparting scientific and rational awareness among the mass (for instance the Kerala Sastra Sahitya Parishad). It is the combined cumulative effect from the vast infrastructure of informal and formal education that has raised the social consciousness of the Keralites, which in turn accounts for their high aspirations and hence achievement of human development.

It should be noted that opportunities for education of girls were recognised in Travancore, the major princely state of then Kerala, as far back as in 1859, by opening a separate school for them (the first English school started functioning in Travancore in 1836!), and subsequently, the principle of free primary education for *both the boys and girls of all communities, including the 'untouchables'* was accepted and practised during the reign of Sri Mulam Tirunal (1885 – 1924).

It goes without saying that such enhanced social development is impossible without the required social infrastructure as also the complementary economic infrastructure. The latter is significant in contributing to the efficient utilisation of the former. For example, transport services contribute largely to physical access to schooling and health care facilities, and rural electrification has positive impact on education.

4. Behind the Development Experience

Human Development and Economic Growth: A Chain Interaction

The development experience of Kerala was brought to world-wide attention with the publication in 1975 of a case study with reference to Kerala on 'Poverty, Unemployment and Development Policy' by the Centre for Development Studies under Prof. KN Raj. The unique phenomenon of human development Kerala presented *apparently* without the corresponding economic capability sought to disprove the accepted paradigm of the 'Harrod-Mahalanobis model', and attained the status of a 'model' itself, which, however, we would like to call 'the Kerala way of development' (Kannan and Pillai 2003 a, b). The voluminous literature that has since then followed in attempts of mystifying and demystifying the 'model' conveniently overlooked the significant role of the very active state intervention in infrastructure development as well as the high per capita private consumption expenditure in Kerala, the recognition of which would have explained the 'model' in better light. It is true that Kerala started her human development surge on a weak economic base thanks to the consistent compulsion of public action in a complementary mould of both popular demand for and public provision of infrastructures. The crucial point is that even then, when the coffer was small in size, the State could find sufficient ways and means for provision for infrastructure development, a major chunk of the coffer going into it.[4] It was the will of the state that mattered, and economic capability

[4] For example, development expenditure of Kerala accounted for about 60 to 70 percent of the total expenditure of Kerala till the late 1980s, and education for about 50 percent of the development expenditure till the start of the 1980s.

responded. It responded to the extent of the requirement set by the specificities of the historical, social and cultural life of the State. It goes without saying that the high human development standard Kerala has attained in turn reflects a high level of investment in the concerned infrastructures that in turn could only be accounted for by a *correspondingly adequate* economic capability, the adequacy norm being specific to the historical, social and cultural life of the State. Compared with some other norm, this economic capability might appear 'small', but to the extent that it *could* generate wonderful results, it was not small. In this sense Kerala's human development could not be independent of economic capability.

What has further missed the apparently studious eyes in general is the fact that the human development Kerala achieved has in turn after a lag started to lead economic growth up through the service sector. This is very much evident in the enormous growth in per capita consumption expenditure Kerala has registered since the late 1970s. Until the mid-1960s, the per capita consumption expenditure (PCCE) of Kerala was 35 per cent below the national average. However, in 1983, the PCCE of Kerala rose to Rs. 152.1 against the national average of Rs. 125.1 and in 1999-2000, it was Rs. 816.8 against Rs. 591 for all-India (Planning Commission 2001: Table 2.2). This was made possible by the huge amount of foreign remittances from the Gulf Keralites, as also by the easy availability of credit facility and plastic money. It needs no note that the large-scale emigration from Kerala followed her human resources achievement. Had the actual overseas remittances with its multiplier effect been accounted for in the estimation of the State per capita income, and the size comparison qualified for the State's adequacy norm associated with the specificties, the alleged fragile economic base (in terms of low per capita income) would not have found a place in the 'model'. It is significant to note that Kannan and Hari (2002: Table 4) shows that the 'actual' State income, for example, in 1999-2000 would be about 23 per cent higher than the official one, if the Gulf remittances were accounted for. It can also be found that if income is assumed to follow the momentum of consumption expenditure, both relative to all-India, then the actual State income of that year would be about 21 percent higher than the official one.

It should also be noted that the enhancement in economic capability of the Keralites also is very much evident in the state's improved human poverty index (Planning Commission 2001 Tables 1.3, 1.4); there has been a steady drastic reduction in the number of people below poverty line in Kerala over time (Planning Commission 2001 Tables 2.19, 2.20, 2.21). The vast liquidity made available in Kerala also fostered an ever-expanding durable goods market. For one instance, Kerala added more than a million vehicles to its fleet during a decade, 1971-81, with a rising trend ever since (Economic Review of Kerala, various issues). Such an enhanced economic capability could not have been made possible but for an enabling environment of economic growth (of course measured in terms of consumption expenditure, not official per capita income). And this economic growth cannot but be potent for further improvement in human development. In fact, there is enough evidence that the human development Kerala achieved has not only firmed up but also been improving enormously over the years. For example, literacy rate increased from

70.42 percent in 1981 to 90.92 in 2001. Life expectancy at birth increased from 64.7 years for male in 1979-80 to 71.67 years in 2001-02 and from 69 years for female to 75 years during the same period, against 64.1 years and 65.4 years in 2001-02 respectively for male and female for all-India (Government of Kerala 2002: 249). Infant mortality rate came down from 17 in 1991 to 15.6 in 1998, against 71.6 in India (Economic Survey of India 2001). No doubt, this has been made possible by the ever-growing standard of living that is economic growth. Thus Kerala today presents a variety of a unique organic system of interactive development forces – a sort of cumulative causation through what we call a 'chain interaction': human development $\rightarrow$ economic growth $\rightarrow$ further human development….. True, there has been a strong *balanced*, inter-complementary, link between human development and economic growth in Kerala, unlike characterised by the UNDP in *Human Development Report*: 1996. In what follows we prove and discuss this proposition in the context of infrastructure development, as human development is the outcome from it.

The Invisible Hand

As explained above, it was the political will that prevailed over the constraints of economic capability in bringing about wonders in Kerala. This political will sums up the spirit of public action, involving both the demand and supply forces: organised public demand and willing state provision. And this in turn is made possible by a historical conjunction of complementary interaction between an objective enabling environment and a subjective receptivity, the motivations of the agents, here the state and the public, to act.

The initial objective reality in Kerala, to be precise, in the then princely States of Travancore and Cochin, corresponded to a state of flux in which the old order was fast falling under the pressure of the social-economic changes brought about by monetisation and commercialisation, nascent industrialisation and proletarianisation of the working mass. The freedom struggle imparted the inevitable political dimension to this flux.[5] Interacting in/with this objectivity condition in a complementary coupling is the motivational receptivity of the agents to development. The factors that determine such motivation are generally considered on two sets of assumptions[6] of *homo oeconomicus* and what we call *homo civicus*.

The former builds up motivation on self-interest in classical and various neo-classical frameworks. It is easy to conclude (for example, see Kannan and Pillai 2003 a, b) that in the various stages of social development in Kerala, self-interests solely accounted for the motivation that worked behind the popular receptivity and thus the spread of education and health care. On the part of the princely states, it appeared through the welfare state concept,

[5] For details see Kannan and Pillai (2003 a, b).

[6] See for details Alkire and Deneulin (2002).

which had been functionalised in pursuance of the self-interested legitimation function of the capitalist state in the mid-19th century with the provision of public elementary education in Europe. The role of the Christian missions in education and health care in Kerala, though motivated again by self-interests, also is significant. The educated were absorbed in government jobs that earned them income security and social status that went into the making of the subjective frame of receptivity of a self-interested *homo-oeconomicus*. For the lower strata of the society there were added motivations, as education offered immense scope for vertical mobility, with implications for promoting equality, and this led to increasing demand for education. Honouring the legitimation function of the state continued in the independent Kerala too, along with self-interest driven populism and corruption, the only highest common factor in the political permutations in coalition governments.[7] Such a demand-supply dialectics, entirely actuated by self-interests on both the sides, in fact stood to *institutionalise* these aspirations and measures to such an extent that it became mandatory for the later governments not to ignore them, except at the cost of their own survival.

On the other hand, the *homo civicus* assumption highlights such virtues as Aristotelian *philia* (friendship or affiliation, and altruism, Deneulin 1999) Sennian sympathy (Sen 1982) and obligation/commitment (Babchuk and Booth 1969, Kreps and Donnermeyer 1987, Dresbach 1992), communal identity and self-expression, moral rules, social norms, motivation to please others and long-term self-interest (Alkire and Deneulin 2002). That individuals identify so strongly with the collectivity (for ideological or other reasons) that the social interests override the personal ones is evident in the countless instances of personal sacrifices during the political struggle for realising the first generation rights in Kerala, as elsewhere.[8] Even prior to that, Kerala witnessed along with the social reform movement the emergence of *homo-civicus* in contrast to the *homo-oeconomicus* in motivations. Similarly, the initial spread of communism in Kerala had the motivational elements of both a self-interested *homo-oeconomicus* and a self-sacrificing *homo-civicus*.

It is the dialectics of these objective and subjective forces that has synthesised the development phenomenon in Kerala. Our point however is that this synthesis came out almost as an unintended consequence of formally unstructured and uncoordinated events and actions of many separate self-interested individuals/groups (including the state). It appears that an 'invisible hand' that is the historical dialectics was at work here – in line with the Smithian translation of self-interests into social interest in their cumulative

[7] Both populism and corruption played major roles in the public supply of development projects. For one instance, allotting schools and colleges in the private sector essentially involved communal appeasement and kickbacks. For an account and analysis of the costs of populism and corruption in the power sector of India, especially of Kerala, see Kannan and Pillai (2002: Chapters 5 and 10).

[8] "There are many other cases that involve the subordination of individual to group interests in which individuals make lesser sacrifices in the interests of the group. The actions of people involved in political activism, or trade union activity, provide good examples." (Heyer *et al.* 2002: 11).

collectivity. In what follows we also analyse and prove this proposition in the context of infrastructure development.

5. Methodology

In this paper we mainly analyse the trend of the infrastructure growth in Kerala in its aggregate and components during the last four decades (1960-61 to 2000-01). More precisely, it is the growth of the relative position of Kerala in the scale of infrastructure development in India we are analysing. This is based on an 'index of relative infrastructure development' estimated by relating Kerala's proportion of total infrastructure stock (or services) of India to its proportion of total population (or area, as the case may be) of India. This index thus expresses the extent, in percentage terms, to which Kerala has more than or less than its share of infrastructure (stock or services) in India, in relation to its share of population (or area) of India. Thus the relative index is given by:

$$\text{Index of relative infrastructure development} = \frac{y_i / \sum y_i}{p / \sum p} \text{x}100 \qquad \ldots (1)$$

where y_i = ith infrastructure stock (or services) of Kerala

Σy_i = the corresponding stock (or services) of India

p = population (or area) of Kerala

and Σp = the corresponding population (or area) of India.

Note that the index may also be written in terms of proportion of per capita infrastructure, that is, as a ratio of the relative indicators of Kerala and India:

$$\text{Index of relative infrastructure development} = \frac{y_i / p}{\sum y_i / \sum p} \text{x}100 \qquad \ldots (2)$$

Thus the index is also interpretable in terms of the extent to which, in percentage, the per capita infrastructure of Kerala is above or below the Indian one. An analysis of the trend of the relative indicator, that is, per capita infrastructure, of Kerala, given by the numerator in the above index (2), vis-à-vis the relative index (2) provides an indication of the relative position of Kerala in infrastructure development in India over time.

The following are the relative indicators we use for the analysis; it goes without saying that the choice of indicators has been determined mainly by the availability of time series data.

1. **Irrigation**: Gross irrigated area per 100 Hectares of gross cropped area.
2. **Communication**: Number of telephone connections per 1000 population;
   Number of post offices per 100-sq. km. of area.
3. **Transport**: Total length (KM) of roads per 100-sq. km. of area;

Total length (KM) of rail route per 100-sq. km. of area.

4. **Electricity**: Per capita electricity consumption.
5. **Banking**: Number of banks per 100-sq. km. of area.
6. **Education**: Total number of schools per 100-sq. km. of area;
   Number of teachers per 100 pupils in schools.
7. **Health**: Total number of medical institutions per 100-sq. km. of area;
   Total number of beds in hospitals per 100,000 population.

Most of the relative indicators here represent coverage by the corresponding infrastructure stock except for irrigation and electricity, where the corresponding output measures do. For communication, transport, education and health, we consider two indicators each. In the case of post offices, banks, schools and medical institutions, coverage is considered in terms of density of the stock in an area, rather than in terms of number of people to be served by that stock. The former indicates (spatial) accessibility (and thus availability), while the latter is only a measure of utilisation, which is possible only if the former, accessibility, is ensured. Hence the primacy of accessibility and density measure.

6. Development of Infrastructure in Kerala

Annual relative indicators of each of these 11 infrastructure components are estimated for both Kerala and India for the four decades from 1960-61, the ratio of which yields the relative infrastructure development index of the particular component for Kerala. Note that we have two components each for transport, communication, education and health. Simple average of the components is used to get the composite index of each of these four infrastructures and the aggregate infrastructure index is the simple average of the 11 components. The four components of education and health yield the social infrastructure index and the remaining 7, economic infrastructure. Figures 1 – 11 plot the time series of the relative indicators [the numerator in (2)] and the associated component-wise indices, while Figures 12 and 13 those of the composite and aggregate indices. In Figures 1 – 11, the upper panel shows the relative indicator and the lower panel, the respective infrastructure index, along with their corresponding smoothed series (obtained from kernel smoothing). Note that the indices are given in a scale with a base of unity. An index greater than one indicates a better level of infrastructure development of Kerala than of all-India. Again, a rising index implies a faster growth rate of the relative indicator of Kerala than of all-India, and a falling index, a lagging growth rate.

Irrigation

The gross irrigated area per 100 hectares of gross cropped area in Kerala, taken as a proxy for the irrigation infrastructure, given in the upper panel of Fig 1, increased from 8.11 in 1960-61 to 15.12 in 2000-01 (at an annual average growth rate of 1.6 percent) against the all-India indicator

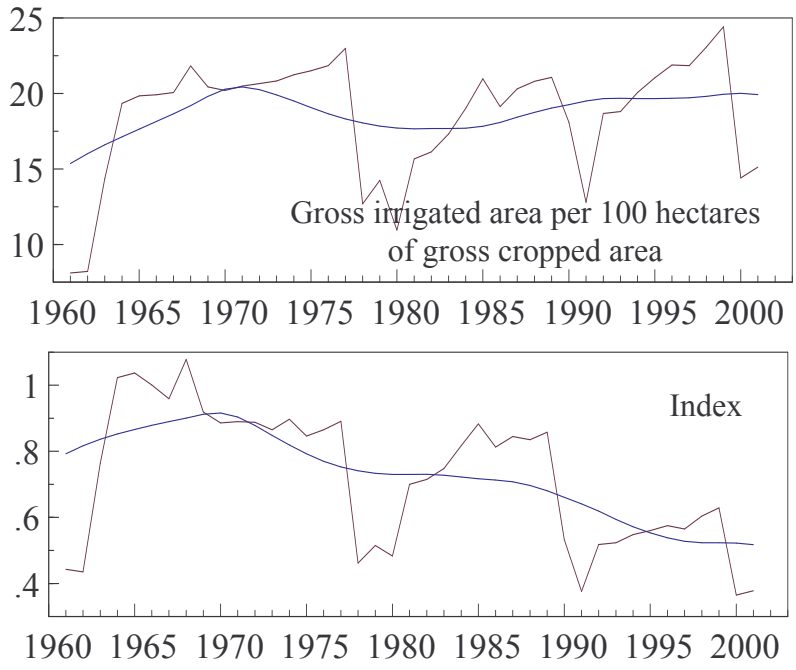

Fig. 1: Irrigation

of 18.3 and 40.1 respectively for the two years, with an average growth rate of about 2 percent per annum. It can be seen that the Kerala indicator has had a somewhat stagnant trend since the 1970s, and in relation to that of all-India, it has been on a decline since then (as shown by the index in the lower panel; also compare the two growth rates). Note that this infrastructure stock, as measured here, was comparable with the all-India level only for a few years in the 1960s (the index being around unity), but has started to fall since then.

Though the cumulative investment so far made in the irrigation sector of the State under the five-year plans amounted to Rs. 2735 crores by 2000, the net physical coverage of 3.57 lack hectares was not at all commensurate with it (Government of Kerala 2000: 78). The irrigation infrastructure in Kerala appears to have failed in bringing new areas under cultivation or increasing the cropping intensity. Even in the case of paddy, the major beneficiary of this infrastructure, the marginal yield on account of irrigation support is found to be insignificant (*ibid.*). Given the increasing bias towards cash cropping and the substantial reduction in the area under paddy cultivation in Kerala, even the significance of the already developed systems is in question. It is worth noting that the irrigation sector in Kerala has been one of the few most lucrative and notorious avenues of corruption in the State's political economy. Not a single project is there in the State without substantial time and cost overruns. Kallada, started in 1961, is a classical case of 'ongoing project' with a

55 times cost escalation; Kanhirapuzha (1961) and Pazhassi (1962) with more than 30 times cost increases follow suit (Government of Kerala 2002: 110).

Transport

It should be noted that an important facilitator of the spread of education and health care facilities in Kerala has been the unique ecological feature, with no urban-rural demarcation. There has been an evenly dispersed settlement pattern (which might be due to the mostly undifferentiated access to water), and this in turn has helped the fast spread of most of the economic infrastructures that have strongly complemented the social ones in their accessibility. Transport is one among them; it goes without saying that transport has had a significant role in making education and health care facilities accessible to the populace in Kerala.

We consider two indicators only in transport: total road and rail route length. Kerala appears to have a satisfactory trend of road development, with a total road length of 137,678 km. by 2000-01, accounting for about 4 percent of total road length in India. Road availability in Kerala is now 3.23 km. per sq. km. of area, which is much above the all-

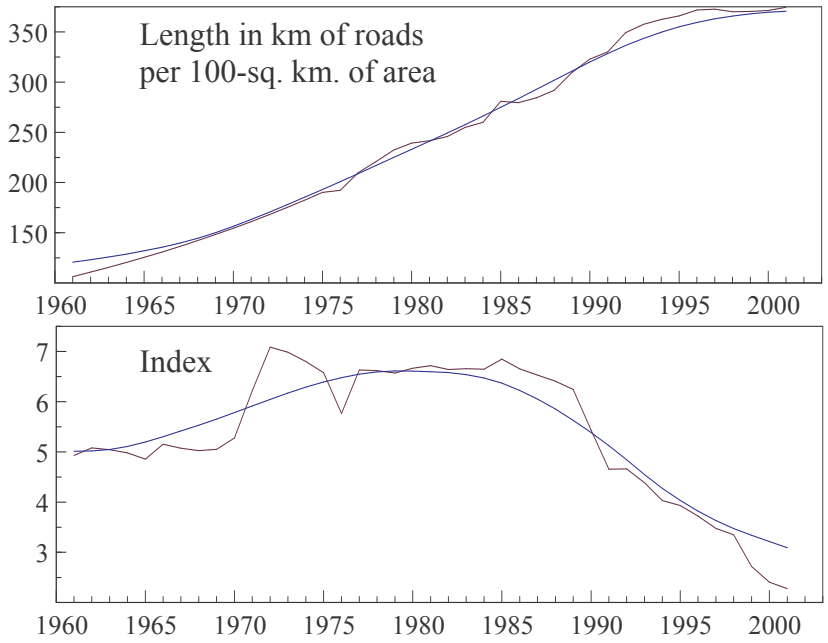

Fig. 2: Road

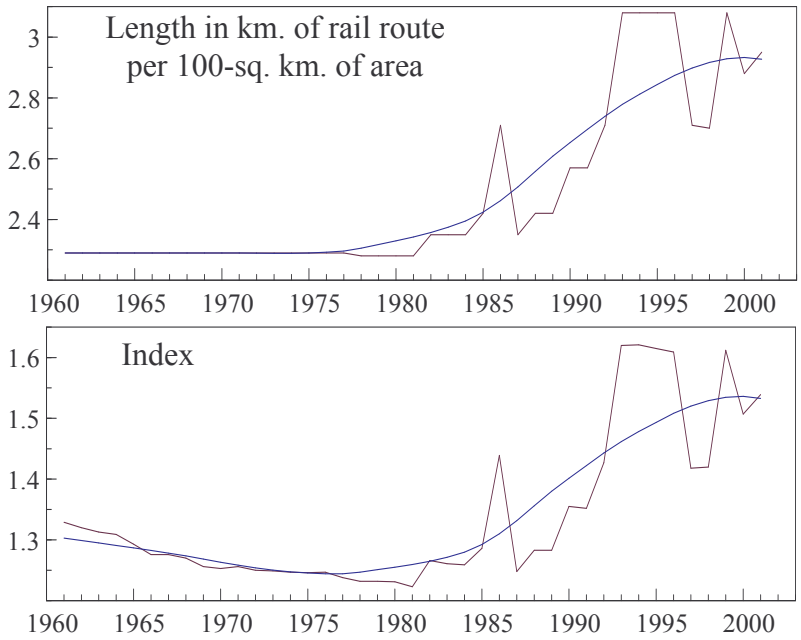

Fig. 3: Rail Route

India average of 1.42 km/sq. km.[9] It was 1.06 km/sq. km in 1960-61 against the all-India's 0.21 km/sq. km. Note with reference to Fig. 2 that road development index of Kerala, with a concave trend around 1980, has always been much above unity, indicating better performance than all-India with significant development potential. It should also be noted that since 1980, the road index has been steadily falling, though still being much above unity, as the all-India average started to grow faster (at a rate of 4.8 percent per annum against the Kerala's 2.8 percent over the four decades). The slower pace of Kerala by no means is an indication of any 'satiety level' in road development in the State; though Kerala has achieved road connectivity to all the villages, it does not mean connectivity of all the habitats. There are still miles to go. And it is in this context the decline in the index appears distressing.

Further, the pressure on the road system of Kerala is extremely heavy; Kerala has since 1980 added to her fleet more than two million motor vehicles, at an average growth rate of 12.5 percent per annum. Number of motor vehicles per 100-sq. km. in Kerala increased from 308 in 1975 to 450 in 1980 and to 5958 in 2002. Whether this spectacular growth in Kerala's fleet could be accommodated safely in her road infrastructure is worth analysing. The growth of the road network has helped expand connectivity substantially, but it tells nothing of the correspondingly expected growth in quality of the network. And even a

[9] In relation to population, the road length is 432 km for every one lakh population in Kerala, as against 299 km for India.

casual observation yields very distressing results, in line with the general complaint about the conditions of the roads in Kerala. Most of the village roads in Kerala lie neglected, without any maintenance for a long time. It is ironical to note that this neglect has thickened in the process of the much eulogised decentralisation in the State that has freed the village *panchayats* from the clutches of the Public Works Department in matters relating to the design and implementation of construction works. However, this has only resulted in a distortion of resource allocation, with much of the resources going to meet the *panchayats*' preference for `individual beneficiary-oriented programmes' such as distribution of seeds, livestock, housing grant, books, uniforms, and so on with ample scope for the political economy of corruption, leaving little for infrastructure development.

The pressure on road could be eased, were the alternative rail route system developed adequately. The railway network in the State, spread along 13 railway routes, has a length of 1148 km. It is since 1980 that some perceptible progress has been achieved in the addition to rail route length; compared with all-India, this achievement appears significant also. The State has at present a comparative indicator of rail route length of 2.95 km per 100-sq. km. of area against the all-India average of 1.9 km. The corresponding figure for Kerala in 1960-61 was 2.3 km and for India 1.7 km, with an annual growth rate of 0.63 percent for Kerala and 0.27 percent for India over the four decades. Note that Kerala has always had an advantage over all-India of having a greater than unity index of rail route and an increasing trend since 1980 (Fig. 3). Note that 1980 marks a turning point in both the cases.

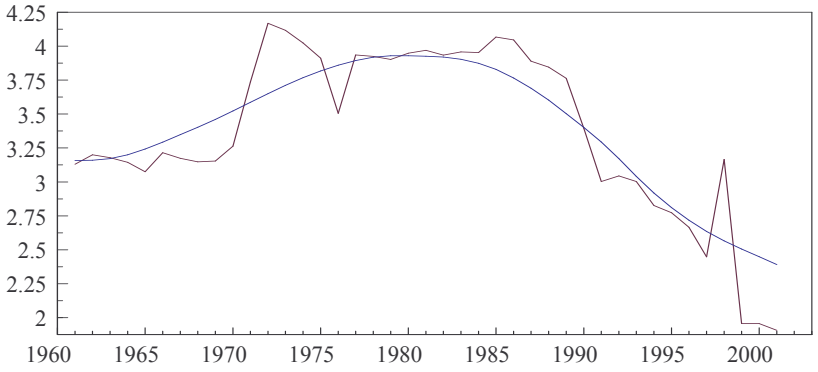

Fig. 4: Transport Index

The combined index of transport infrastructure is given in Fig. 4; note that its trend copies the concavity of the component road index, falling since 1980, *the* turning point, but still much above unity.

Communication

Here we consider two infrastructures: telecommunications and post offices. Globalisation and the emergence of knowledge based economy have ushered in a revolutionary significance for telecommunications. And the vast consumer society of Kerala has been quick to be equipped with the device that narrows down the global distance, as Fig. 5 indicates. The number of telephone connections in Kerala by 2001-02 rose to 2,694,156, an addition of about 2.5 million connections over 1989-90. The number of telephone exchanges in the State increased from 286 in 1975 to 5073 in 2002 (at an annual growth rate of 5.1 percent), and the number of public call offices from 2352 to 48321 (at an annual growth rate of about 12 percent); consequently, the equipped capacity had a phenomenal growth of over 15 percent during the same period.

Kerala's telephone density of 85 per 1000 population and the rural telephone density of about 71 (as in October 2002) are much above the national average. There were 69 telephone connections in every sq. km. area of the State in 2001-02. In 2000-01, the telephone density was 68 per 1000 population against the all-India average of 32. In 1960-61 it was just close to one in Kerala against 1.1 of all-India. And the growth of this infrastructure in Kerala has been phenomenal, as the exponential rise in the index since the mid-1980s shows, with an annual growth rate of about 18 percent (Fig. 5). Over the four decades, the relative indicator of Kerala had an average annual growth rate of a little above 11 percent against the all-India's below-9 percent. The relative growth of this indicator by 2000-01 over 1960-61 was as much as 2.6 times that of the all-India one.

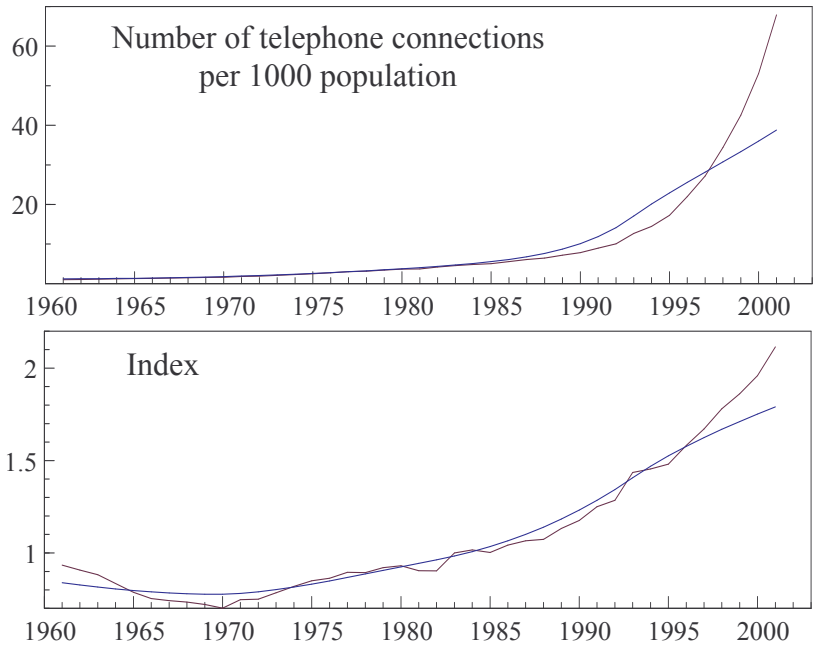

Fig. 5: Telephone

Kerala has had an edge over all-India on the front of post offices also. A number of favourable demand factors were at work behind the fast spread of post offices in Kerala, including emigration of the Keralites to other parts of India and abroad, literary movements and spread of print media. By 2000-01, there were 15.9 post offices to serve one lakh population in Kerala, as against 15.2 in all-India. In the next year, on an average, one post office in Kerala served 6276 persons in an area of 7.66 sq. km. It is significant to note that out of the 5073 post offices in Kerala at present, as many as 4194 are in rural areas. The relative density indicator of post offices, that is, number of post offices per 100-sq. km. of area in Kerala had an increasing trend over time, but with a marked lull in acceleration since 1980 (Fig. 6). Even in 1960-61, Kerala was fortunate to stand far above all-India with 7.45 post offices per 100-sq. km. of area against just 1.52 of all-India. These increased respectively to 13 (for Kerala, at an annual growth rate of 1.4 percent) in 2000-01 and to 4.7 (for all-India, at a rate of nearly 3 percent per annum). The index always remained much above unity; but the all-India relative indicator grew much faster than the Kerala one till the late 1970s, so that the post office infrastructure index of Kerala fell sharply to below-3 mark (about 2.8) and lay there thereafter stagnant. Both the all-India and the Kerala indicators had almost equal but very weak growth momentum (of a meagre 0.6 percent per annum) during this period; note the about-to-stagnate relative indicator of Kerala in the upper panel of Fig. 6.

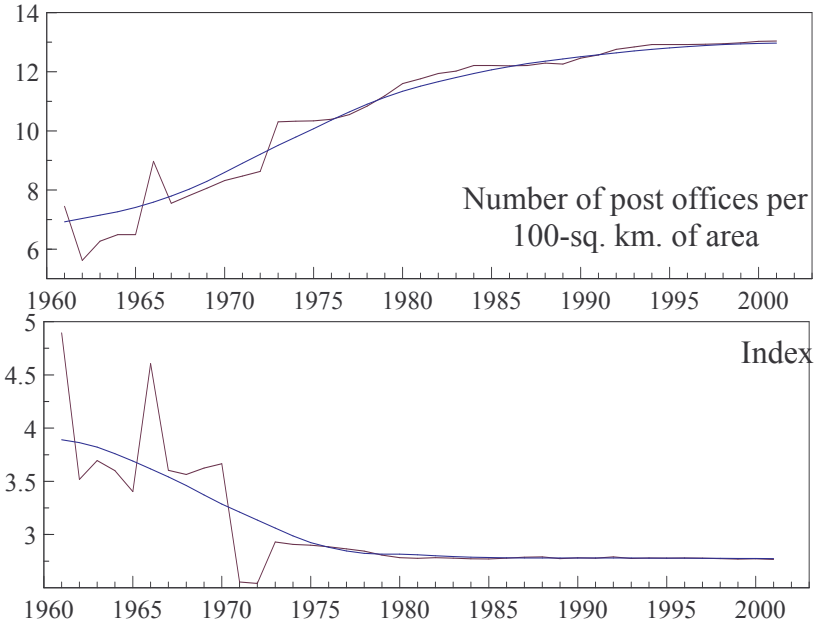

Fig. 6: Post Offices

The combined index of communication infrastructure with a convex trend, comfortably above unity, is given in Fig. 7; note its slow rising trend since 1980, *the* turning point, under the combined strength of the rising and stagnating trends of the component indices.

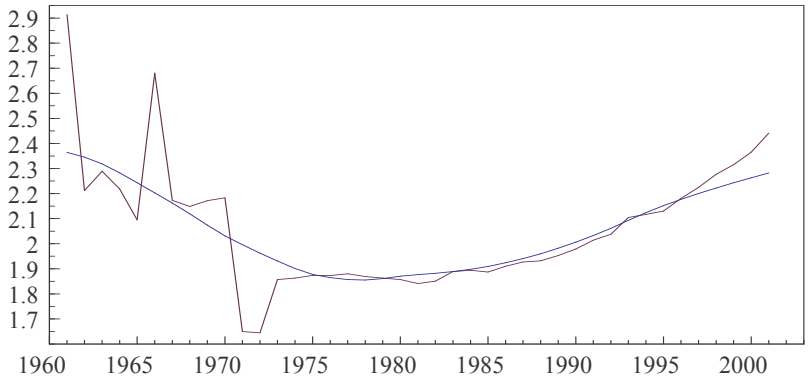

Fig. 7: Communication Index

Banking

Banking habit in Kerala has picked up wide currency thanks to Gulf remittances especially since 1970, leading to a sustained spurt in number of deposits as well as bank branches. By 2001-02, there were in Kerala 49 commercial banks, 2 regional rural banks, 44 primary co-operative agriculture and rural development banks, 14 district co-operative banks and one State co- operative bank, all with a total of 3861 branches. Besides, 1634 primary agricultural credit societies are also in the field. Kerala had a significant edge over all-India always in respect of her relative indicator, such that the concerned index always remained well above unity (Fig. 8). Thus with 9.8 banks per 100-sq. km. of area, Kerala stands far above all-India with just 2.1in 2000-01. In 1960-61, it was 1.35 against a meagre 0.15 of all-India. Note, however, that a tendency for stagnation has set in since the mid-1980s in the relative indicator of Kerala, though still much above that of the all-India. It is also significant that the all-India relative indicator was on average growing much faster (at an annual rate of 6.8 percent) than the Kerala one (at 5.1 percent) over the period, imparting a declining trend to the banking index of Kerala. During the 1990s, however, there was a perceptible stagnation in the index, suggesting a catch up between the two rates (at about 1.1 percent per annum), and a rise in the next year.

It should be noted that Kerala has been in a better position in terms not only of accessibility, but also of its utilisation. Thus there were about 12 bank branches in 2000-01 to serve one lakh population in Kerala against 6.7 in all-India. The average population covered by a bank branch in Kerala was about 8300 in that year, which came down to 5876

in the next year. There was a phenomenal increase in the volume of banking business also in Kerala (by 191 times that of the 1969 level). During the 12 years from 1990, the total deposits with the banks in Kerala grew at an average rate of 18.6 percent a year; the NRE deposits at 23.2 percent and the domestic deposits at 16 percent. Despite such spectacular growth in deposits, the credit-deposit ratio (CDR) of Kerala has been one of the lowest in India. It remains more or less stagnant at 42 percent. It reflects that credit disbursements

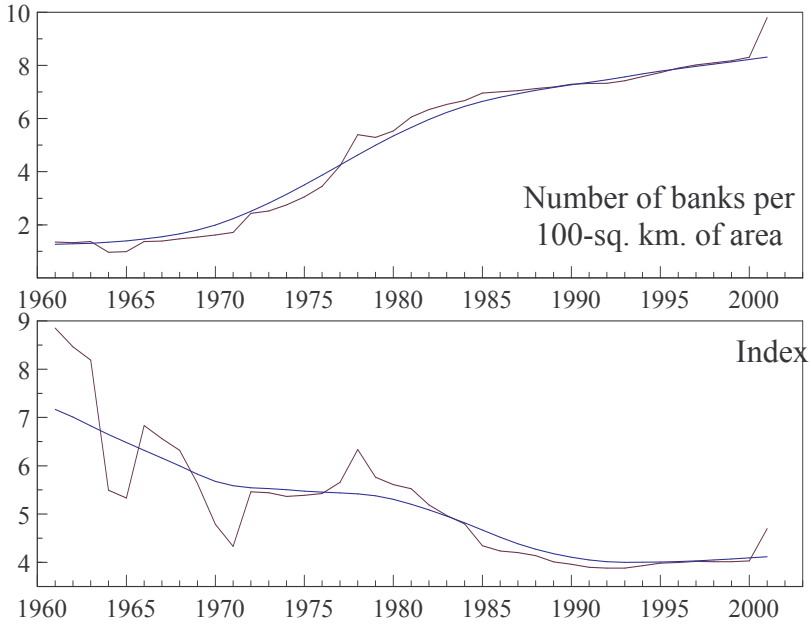

Fig. 8: Banks

are not on par with the deposit mobilisation in the State. Note that CDR is a product of the ratio of the number of credit accounts to deposit accounts and the ratio of credit amount per account to deposit amount per account. While the first of these ratios of Kerala (ratio of the number of credit accounts to deposit accounts) is one of the highest in India, the second ratio (ratio of credit amount per account to deposit amount per account) is much lower, because the credit amount per account of Kerala is one of the lowest in India, though the deposit amount per account is comparable with the all-India level (Government of Kerala 2002: 359). The low credit amount per account in turn indicates credit deployment in favour of 'small' customers such as in small-scale/mini industries, and for housing and vehicle loans. Evidently large industries are left out; and the causes are worth analysing: either there is no demand from large industries or the banking sector prefers only the small creditors, may be because of risk factors.

Electricity

None might be worse in Kerala than the power sector. The accumulated inefficiency on all the functional fronts, from perspective planning through technical operation and revenue collection, has rendered the State electricity board an easy victim for the so-called World Bank restructuring, which however is being delayed thanks to public resistance (for details see Kannan and Pillai 2002; Pillai 2002). The growth on the generation front of the Kerala power system has been too inadequate to meet the ever-increasing demand, despite cent percent electrification achieved long back. It should be noted here that cent percent rural electrification became possible in Kerala thanks to her distinct ecological pattern. In spite of complete rural electrification, only 70.2 percent of the households in Kerala are still electrified as per 2001 Census, with wide urban (84.3 percent) and rural (65.5) disparity. Capacity deficiency has been felt pinching since the early 1980s, ushering in an era of restrictions on new connections and load shedding. An absence of a perspective planning in the development management of the system coupled with the inordinate time overruns of almost all the hydro-power projects of the State has been behind this deficiency problem. The system now manages to function thanks to

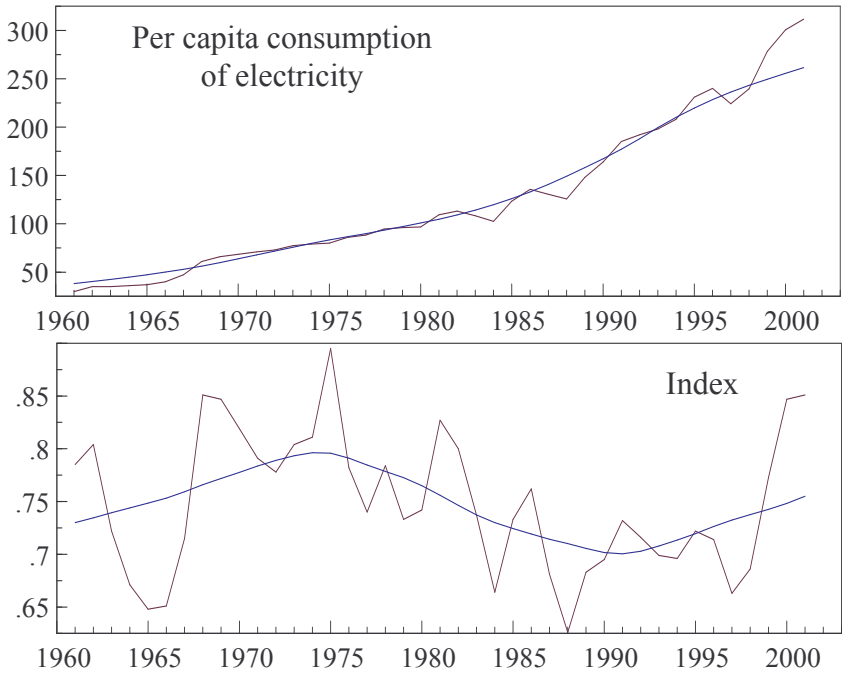

Fig. 9: Electricity

large-scale energy import; for example, in 1999-2000, import constituted 43.6 per cent of the total energy sales in Kerala, and the corresponding (import) cost, 38 per cent of the

total expenditure. In 2001-02, import was 45.4 percent of the sales. The capacity shortage and the higher transmission and distribution losses have resulted in high degree of unquality (that is, unreliability) through black outs and brown outs across Kerala. Hydro plants are generally expected to be much less prone to forced outages than thermal plants, and thus always available at maximum subject to firm power capacity constraints. However, the hydro plants in Kerala stand an exception with higher forced outage rates and loss of load probability[10] (Pillai 1991, 1999). Widespread demand for stabilisers, inverters and gen-sets among the Keralaites is a manifestation of the unreliability of the power supply.

Since the installed capacity in the power sector of Kerala is not at all representative of the actual demand and hence of the significance of this infrastructure, we consider for analysis per capita energy consumption,[11] an output (flow) measure, to proxy the infrastructure stock of this sector.

With a slow rising trend (see Fig. 9), per capita energy consumption in Kerala, at present at 395 units (in 2001-02,), has always been one of the lowest in India, much lower than that of her neighbours as well as the all-India average. Over the four decades, however, it grew at an average annual rate of 6 percent, against the all-India growth rate of 5.8 percent. Since 1990, as in the 1960s, Kerala's per capita electricity consumption has been increasing at a faster rate than the all-India average, as is evident in the rising trend of the electricity infrastructure index, still much below unity (Fig. 9).

Education

One of the two social infrastructures, the outcomes of which launched Kerala onto the centre of a 'model', education infrastructure in Kerala has commanded lofty lauds.

Commensurate with the population density, Kerala has also had a higher school density, and this along with a better transportation infrastructure ensured expanding accessibility. At present, 94.4 percent of the rural population is served by primary schools/sections within a distance of one km. and 98 percent within 2 km. Upper primary schools/sections are available for 96.2 percent of the rural population within a distance of 3 km., and secondary education for 24.7 percent within 2 km. and for 97.8 percent within 6 – 8 km. (Government of Kerala 2002: 234). The school infrastructure stock in Kerala included 12331 school in 2001-02, with 6754 (54.8 percent) lower primary (LP) schools, 2959 (24 percent) upper primary (UP) schools, and 2618 (21.2 percent) high schools (HS). Of these, 723 HS and 2261 UP schools had LP sections also and 2068 HS had UP sections also.

[10] Forced outages occur when a plant unit is thrown out of service due to unexpected causes such as breakdown, equipment malfunction, etc., and are of a random nature. Loss of load probability refers to the probability that there will be a shortage of power of any magnitude in a given period.

[11] Note that the consumption itself is supply-constrained.

Thus the effective LP school infrastructure in 2001-02 consisted of 6754 LP schools and 2984 LP sections; similarly, there were 2959 UP schools and 2068 UP sections. Thus for every 236 children in the LP school age group, there was one LP school/section in that year, and for every 328 UP school going age group population, there was one UP school/section in Kerala (*ibid.*).

The spatial distribution of this infrastructure has much to do with its accessibility, and Kerala has been fortunate here also. As in 2001-02, Kerala had 130 schools in each corporation area, about 18 schools in each municipal area and 11 in each *panchayats*. In 1960-61, there were 24.4 schools in a 100-sq. km. of area of Kerala against 14.3 of all-India; these went up respectively to 31.7 (at an annual growth rate of 0.66 percent for Kerala) and to 31.9 (at a growth rate of 2 percent per annum for all-India) in 2000-01. Note that the initial advantage Kerala had in the spatial density of schools is on the wane now; this however is expectedly in line with the unique historical stage Kerala has attained in demographic transition, compared with the rest of India.

There has been a perceptible fall in the population in the school-going age group (5 – 14 years) in Kerala since the late 1970s, which has resulted in decreasing demand for further additions in the school infrastructure stock, and hence in a less accelerated growth in it, as is evident in the upper panel of Fig. 10. Note that the index lay above unity in all the four

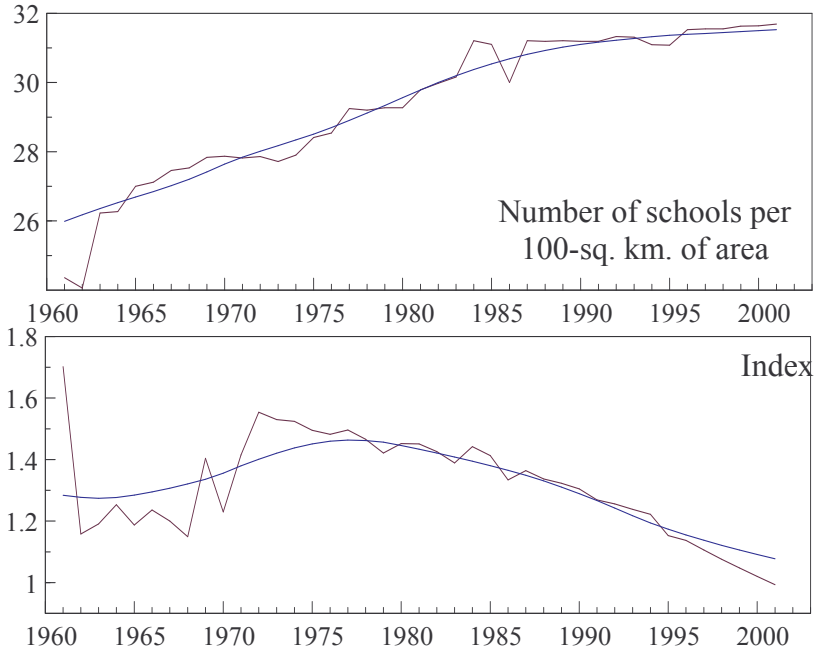

Fig. 10: Schools

decades, except in the last year. This (last year fall), however, need not be a point of alarm; given the fall in demand, which is sure to continue, Kerala's task has now reduced to maintaining her already accumulated infrastructure in good condition for maximum utilisation by adding to quality-facilities.

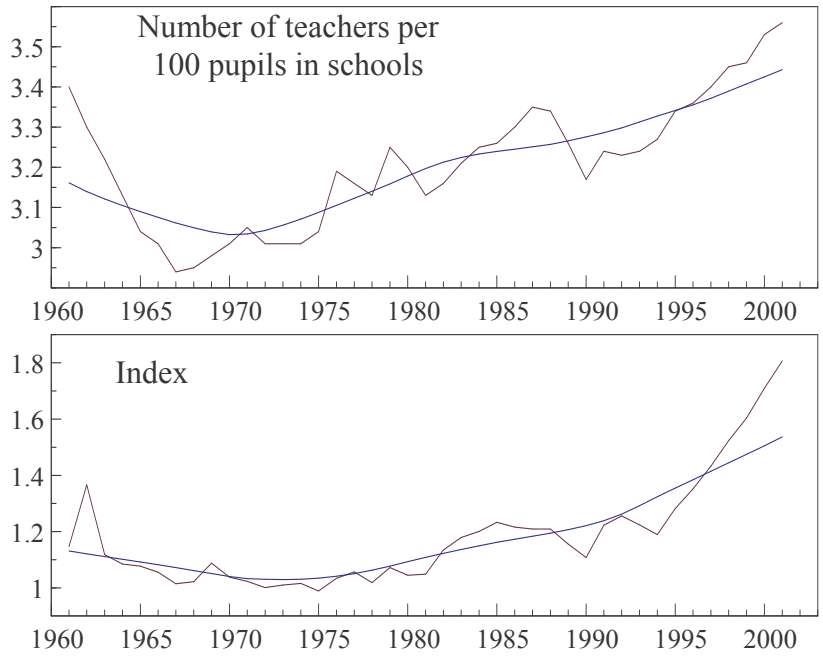

Fig. 11: Teacher-Pupils Ratio

Once accessibility is ensured, utilisation of the infrastructure capacity depends on student enrolment. And Kerala stands far ahead of other States in India here also. Using the projected school age population, it has been found that the enrolment ratio in Kerala at the LP level is almost universal, 100 percent at the UP level and 99 percent at the high school level (Government of India 2002: 235). With such maximum extent of enrolment, efficient utilisation of school infrastructure, that is, quality of schooling, necessarily depends on a favourable teacher-pupils ratio (TPR), number of teachers available for a set of, say, 100 students. Kerala has always been in a much comfortable position in this regard also, with for example, 3.6 teachers per 100 students against about 2 of all-India in 2000-01. It was 3.4 in 1960-61 against the all-India's 2.96. The TPR of Kerala has always remained above 3 over the four decades, while that of Kerala, below 3. The pupils-teacher ratio in the LP section was 44:1 in 2001, and 34:1 in the UP section and 18:1 in the High School section (Government of Kerala 2002: 237). Note also that the TPR of Kerala has since the mid-1970s been growing much faster than the all-India indicator, giving an upward trending index (Fig. 11).

The two indices of accessibility (number of schools per 100-sq. km. of area) and utilisation (TPR) together yield the education infrastructure index, shown in Fig. 12. Note that it has always been above unity, with a rising cyclical trend. Given that the school infrastructure index has been concave, while the TPR index, convex, the positive trend of the education index exudes hopes for the future.

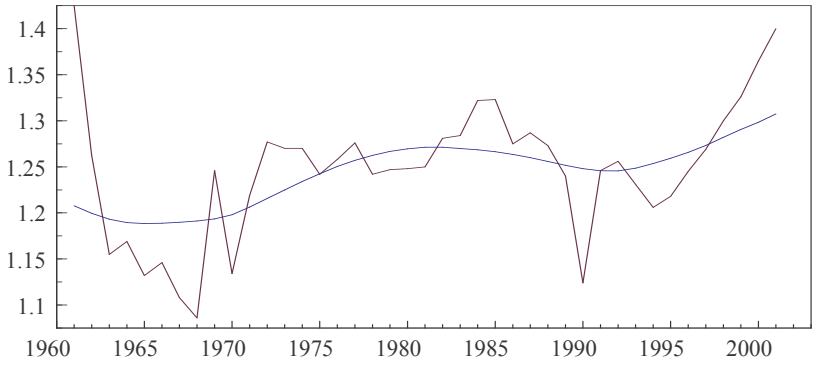

Fig. 12: Education Index

It is significant to note that there has been a strong presence of the private sector in the school education system of Kerala, a majority being aided by the state. In 2001-02, it accounted for 63 percent of the total number of schools in the State, 59 percent being private aided schools and 4 percent, unaided. In the late 1970s, the private sector proportion was about 62 percent, and so was in 1961 (Government of Kerala 1977: 84). Thus both the private and the public sectors have kept a more or less uniform trend of growth over time. Note that almost all the private aided schools (and colleges) belong to the major religious/caste communities of Kerala. It is not difficult to identify the seeds of the spread of private aided schools (as well as colleges) in the corruption and nepotism necessarily involved in the political economy of coalition governments, mostly governed by the major communal interests in Kerala. Nevertheless, its social advantage has been substantial, as history has proved. In fact, Kerala presents here a powerful instance of Smithian proposition on translation of self-interests into social interests.

Equally significant has been the powerful channel of social education through the wide network of informal infrastructure including mass media, and political, social, cultural, literary and library movements in Kerala.

Health

Health development in Kerala, comparable to that of high-income countries, has been the outcome of investment in health infrastructure in public, private and co-operative sectors, along with the people's health awareness and transport facilities. Kerala's health care

network in the public sector, under the three medical systems of allopathy, ayurveda and homoeopathy, had a total of 7831 institutions including sub centres in 2001-02. The institutions under the allopathy system were 1310, with 46800 beds – including 941 primary health centres, 107 community health centres and 143 hospitals. Each sub centre in Kerala serves a population of about 5000 as against 4581 at the all-India level, and each primary health centre, a population of more than 25,000 and each community health centre, about 2.25 lakh (Government of Kerala 2002: 249). It should be noted that as in the case of school infrastructure, each medical institution in Kerala serves a larger population due to high density, but the area covered is much less than in all-India, which in fact ensures greater accessibility. Since we do not have time series information on the health care system in the private and co-operative sectors (as well as ayurvedic and homoeopathic systems), our index refers only to the public sector allopathic infrastructure.

As in the case of school density, the medical institutions density[12] also has always been much higher in Kerala, for example, with 3.3 (public sector allopathic) medical institutions per 100 sq. km. of area in 2000-01 against 1.2 of all-India. In 1960-61, the indicators were respectively 0.64 and 0.38, with an average annual growth rate of 4.2 percent for the Kerala indicator over the four decades against 2.8 percent for the all-India indicator. It is reported that there is one primary health care sub centre for every 6.2-sq. km. area in the State at present and one primary health centre for every 33.3-sq. km. (*ibid*.). About 4 public allopathic medical institutions were available in Kerala for one lakh population as against 3.8 for all-India in 2000-01. Note that the Kerala accessibility indicator, however, appears to have run out of steam since the early 1990s (Fig. 13). The resultant index, though always much above unity, has an apparent cyclical trend, and is now at the low ebb.

As in case of the school infrastructure, along with the 'nearness', there is also the capacity factor that has stood in complementary significance – number of hospital beds per one lakh population. Kerala has always far outweighed all-India in respect of this indicator also (Fig. 14), with a growing trend that has since the late 1980s started to assume some concavity. In 2000-01, there were 118 public hospital beds for one lakh population in Kerala, against 90 at all-India level. The corresponding figures for 1960-61 were about 68 for Kerala and 53 for all-India. The corresponding index, comfortably above unity, has but been on a decline since 1970, with the growth of the Kerala indicator (at an average annual rate of 0.72 percent) lagging behind the all-India one (at a rate of 1.2 percent a year).

From the two component indices (number of medical institutions per 100-sq. km. of area and number of hospital beds per one lakh population), we derive the health infrastructure index, and is given in Fig. 15. The index has always been above unity, with a cyclical trend, resembling that of the accessibility index.

[12] Note that in the case of school education infrastructure index, we have considered both the public and the private sector, but for health index, we have data available only on public sector allopathic system.

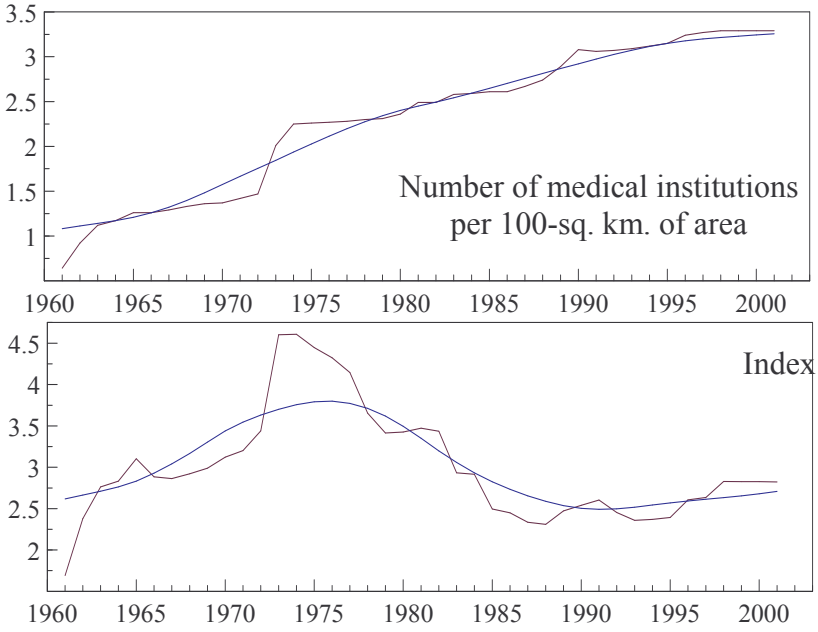

Fig. 13: Medical Institutions

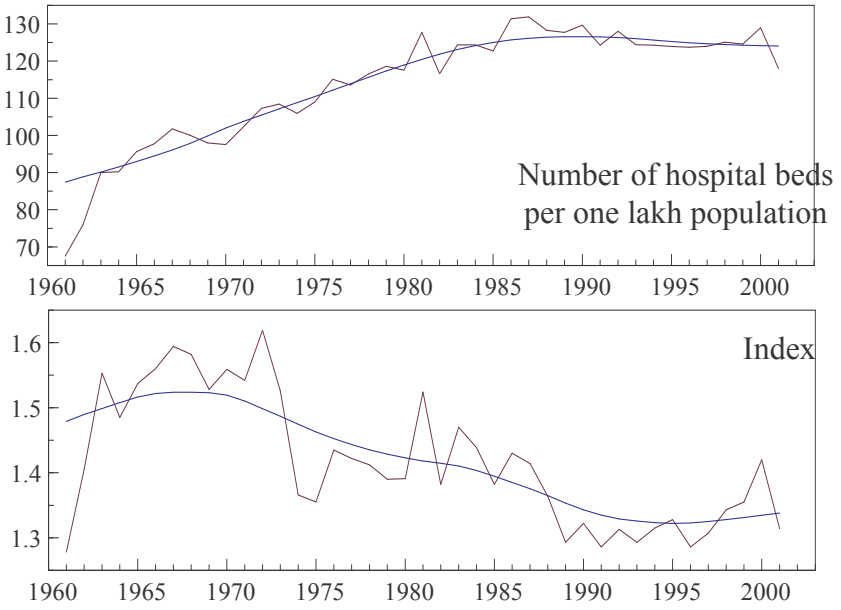

Fig. 14: Hospital Beds

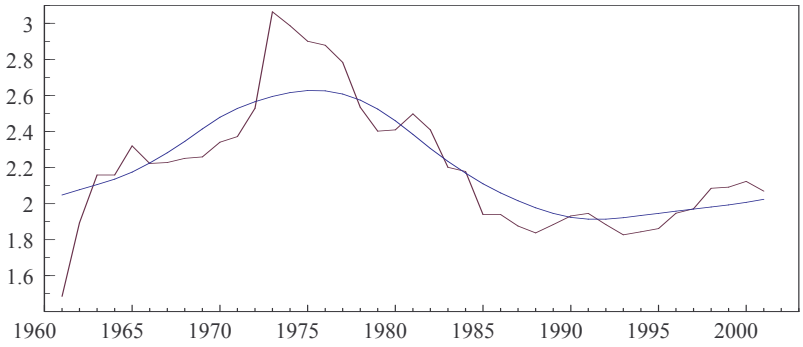

Fig. 15: Health Infrastructure Index

Note that these indicators, though always with an edge over all-India one, can still be an under-estimate; in fact, there has since long been a spurt in private sector health care provision. In fact, as in the case of education sector, private provision far exceeds public one in health care.[13] A recent study conducted by the Department of Economics and Statistics (in 1995) found that there were in the private sector of Kerala 12328 medical institutions with 70506 hospital beds. This included 4288 allopathic medical institutions with 67517 beds (against 1227 public sector allopathic institutions with 37905 beds), 4922 ayurvedic institutions with 2595 beds and 3118 homoeopathic institutions with 394 beds (Government of Kerala 2002: 250). In 1986, according to another survey, conducted by the same Department, the private sector had 3565 allopathic medical institutions with 49030 beds, 3925 ayurvedic institutions with 1301 beds and 2078 homoeopathic institutions with 296 beds, giving a total of 9568 medical institutions with 50627 hospital beds (Government of Kerala 1987). The results from a survey conducted in 1987 by the Kerala Sasthra Sahitya Parishad (KSSP) somewhat tallies with this. It goes without saying that a sizeable proportion of demand for health care provisions is directed towards the private sector in Kerala, especially by the population in the middle and above income classes. And this too has a significant part in the explanation of the health care development in Kerala.

Aggregate Indices

Fig. 16 presents the economic, social and aggregate infrastructure indices. Note that the economic index, always above unity, has, however, a decreasing trend (with a steep decline since the early 1980s) mostly under the influence of the irrigation, and banking indices (as well as the transport index since 1980). It is worth noting that the impact of the fast-growing communication infrastructure index is not visible here. However, the comfortable position of Kerala with the economic infrastructure index being above unity all over the long period is a relief factor, especially considering the widely entertained

[13] However, unlike in the medical sector, most of the private schools and colleges in Kerala are financially aided by the state.

allegations in the converse in substantiation of the 'low economic base' of Kerala. We are of course aware of the disparate and often disappointing behaviour of some of the component infrastructure indices (for example, irrigation and power); but there also are wide silver linings – for example, transport, banking and communication.

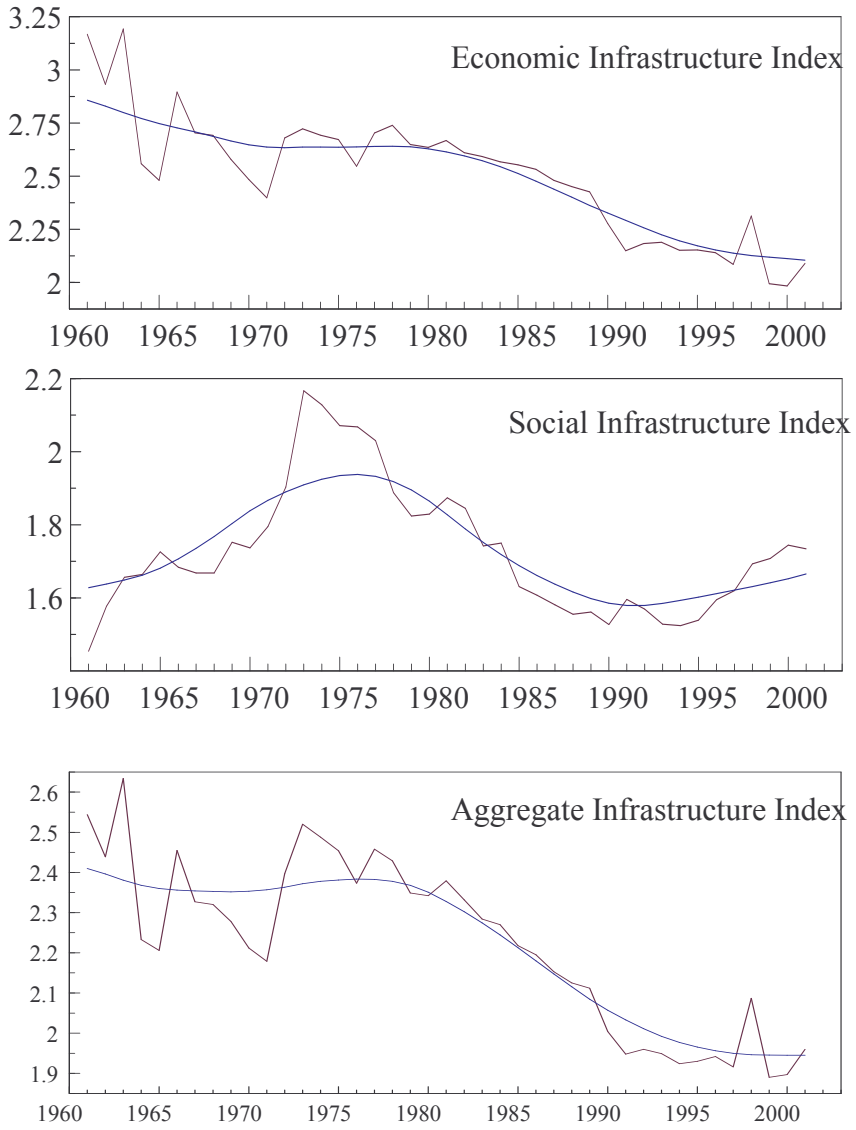

Fig. 16: Aggregate Indices

Social infrastructure index, on the other hand, has a distinct cyclical trend (following the trend of the health infrastructure index), remaining comfortably above unity always. Note

that Kerala at present is about to rise from a fall in the index that started during the late 1970s.

The aggregate infrastructure index, following the behaviour of the economic infrastructure index, has a long-cyclically declining trend and is well above unity. This is in conformity with the earlier results putting Kerala on a high level in respect of infrastructure. Kerala has on the whole

better performed than all-India. However, a pertinent question now is whether this better performance has been consistent with a perspective planning out of sustained public action or just a random outcome of sporadic public action. To be more specific, the public action that has fructified in the high level of human development in Kerala, in fact, represents the sum total of many different, fragmented and self-interest motivated public demand of often independent and even antagonistic pressure groups and the corresponding state provisions (also see Kannan and Pillai 2003 a, b). It is then likely that the short run outcomes of such public action behave quite randomly and their apparent long run pattern be insignificant. At the same time, it is also possible that these apparently disparate public actions in their cumulative collectivity gain some long run perspective of an ideal and their functional outcomes in general behave in some definite pattern – in line with the Smithian translation of self-interests into social interest in their historical dialectics, as we have already discussed. That is, the question is whether the short run and the long run bahaviours of the infrastructure development indices we have found above are significantly consistent with a conscious public action in its organic cumulative totality or just random. To this we turn in the next section.

7. Order or Chaos?

The behaviour of a time series can be analysed to find out whether there is a pattern in it or not, whether the behaviour is just random or not, on the basis of a novel interpretation of the results from a Markov chain of the movements of the time series (for more details, see Pillai 2002 a). A time series may be said to have a pattern of growth (decay) if its upward (downward) movements are cumulative and thus self-sustaining. This cumulative process naturally implies a higher long run probability of rise (fall). In other words, if the probabilities of time series movements in different directions happen to be almost evenly distributed, then its behaviour may just be random. On the other hand, if the probability of upward movements significantly dominates, we have a growth pattern in it. The movements of the series are captured in terms of the successive period changes in it.

Thus the Markov chain model builds upon the sequence of discrete, serially independent, annual changes in the infrastructure indices. At the end of any time period (year in this case), the index change would be in a certain state of nature, indicating the pattern of its behaviour: it may be zero, positive or negative; equivalently, the index level may be constant, rising or falling. From this model is then obtained the state transition probability,

the conditional probability that index change is in state j at time t, given that it was in state i at time t–1, that is, $P(j|i)$, denoted by P_{ij}. In the present context we consider only two states of nature: positive, denoted by 1 and non-positive, denoted by 0. Thus the state transition probability P_{10} denotes the short run probability that the index change moves from a positive state last year to a non-positive state this year; that is, the index level falls now compared with the previous year rise. Similarly, P_{01} is the short run probability of an increase in the index this year from the last year fall. In contrast to these 'transition' probabilities, we have two 'persistent' probabilities[14] also: P_{11} and P_{00}, of being in the same state in both the previous and the present year. We have a short run cumulative effect in the movement of the index, if these same-state probabilities are very high. These four state transition probabilities in turn define two steady state (long run) probabilities of the two states considered: $P(1)$ and $P(0)$.[15] If $P(1)$ is very high, the index in question has a significant long run growth, an increasing trend. Thus the transition and steady state probabilities represent quantitatively the short and long run trends in the series; though these in general correspond to what is graphically available, the Markov chain also provides more statistical information, unavailable otherwise. For example, a given apparent trend, graphically obtained, may not be statistically significant, but just be random. In the framework of Markov chain, we can test for the short run randomness using a Chi-squared test statistic on the null hypothesis that all the transition probabilities are equal (to 0.5) (Pillai 2002 a). Similarly, a z-test for the equality of two probabilities can be used to test for the long run randomness.

The Markov chain model results are given in Table 2. Note that the short run fluctuations of the three economic infrastructure indices, irrigation, rail routes, and electricity, statistically appear quite random. This short run randomness appears to influence the long run behaviour also. The first and the last have apparently falling long run trend [$P(0) > P(1)$, also see Figs. 1, and 9] and the second has apparently rising trend [$P(1) > P(0)$, also see Fig. 3], but these two probabilities in each case are not significantly different from each other, suggesting their possible randomness.

Almost all of the other indices are well behaving. In particular, we find that there is a statistically significant pattern (non-randomness) in the short run behaviour of the following indices: aggregate infrastructure, economic and social infrastructures, banking, transport, roads, communication, telephone, post offices, education, schools, TPR, health, and medical institutions. The transition probabilities for the hospital beds infrastructure are marginally significant. The indices of communication, telephone, social infrastructure, schools, TPR, health, and medical institutions all have a higher same state probability of rise in the short run. This significant systematic short run behaviour in turn maps itself into the long run. Note that they have significantly rising long run trend also [$P(1) > P(0)$], which in general agrees with the graphical result. On the other hand, there is a higher probability for the economic and aggregate infrastructure indices in the short run to fall

[14] Note that these probabilities also belong to the more general category of state transition probabilities.
[15] Note that $P_{11} + P_{10} = P_{00} + P_{01} = P(1) + P(0) = 1$.

Table 2: Transition Probabilities of Infrastructure Index Growth

Relative Indices	P_{00}	P_{01}	P_{10}	P_{11}	χ^2-value	$P(0)$	$P(1)$	$\|z\|$-value
Infrastructure	0.381	0.619	0.722	0.278	4.75*	0.538	0.462	0.479
Economic Infrastructure	0.409	0.591	0.765	0.235	5.49*	0.564	0.436	0.794
Irrigation	0.4	0.6	0.632	0.368	2.12	0.513	0.487	0.16
Banking	0.72	0.28	0.429	0.571	5.13*	0.615	0.385	1.404
Electricity	0.6	0.4	0.421	0.579	1.27	0.513	0.487	0.16
Transport	0.704	0.296	0.75	0.25	7.48**	0.718	0.282	2.495**
Roads	0.63	0.37	0.75	0.25	4.81*	0.667	0.333	1.975**
Rail Routes	0.556	0.444	0.333	0.667	2.56	0.436	0.564	0.794
Communication	0.333	0.667	0.259	0.741	7.59**	0.282	0.718	2.495**
Telephone	0.692	0.308	0.115	0.885	17.31**	0.308	0.692	2.242**
Post Offices	0.75	0.25	0.316	0.684	7.58**	0.538	0.462	0.479
Social Infrastructure	0.615	0.385	0.154	0.846	13.15**	0.308	0.692	2.242**
Education	0.231	0.769	0.385	0.615	5.15*	0.333	0.667	1.975**
Schools	0.722	0.278	0.238	0.762	9.32**	0.462	0.538	0.479
Teacher-Pupils Ratio	0.667	0.333	0.148	0.852	14.7**	0.308	0.692	2.242**
Health	0.417	0.583	0.296	0.704	4.81*	0.333	0.667	1.975**
Medical Institutions	0.5	0.5	0.24	0.76	6.76**	0.333	0.667	1.975*
Hospital Beds	0.65	0.35	0.604	0.396	4.58	0.513	0.487	0.16
Per Capita Income	0.545	0.455	0.588	0.412	0.71	0.564	0.436	0.794
Adjusted PCI	0.364	0.636	0.25	0.75	7.82**	0.282	0.718	2.495**

Notes: Chi-squared value (for 2 df): 0.05 = 5.991; 0.10 = 4.605. |Z|-value: 0.05 = 1.96; 0.1 = 1.645
** = Significant at 5 percent level; * = significant at 10 percent level.

following a rise. They have an apparent declining trend [$P(0) > P(1)$, see Fig. 16], which however is not at all significant; note that they also have, though to a less extent, a short run probability to rise following a fall. In short, they have statistically equal chance for long run growth and decay. The hospital beds index can also be included in this category.

The banking index has a much higher probability to remain in the same state of decline in the short run, giving it a falling long run trend, which however is not significant; it also has, though to a less extent, a short run same state probability of increase. On the other hand, transport and roads indices have a higher short run probability to fall following a rise, supported by a (less-) higher same state probability of decline; and in the long run they come out with a statistically significant declining trend. Similarly, education has a higher short run tendency to rise following a fall; it is also more likely to remain in the same short run state of rise, both yielding a significantly increasing long run trend.

Thus we have enough evidence from most of the indices we have considered here that there has been a definite pattern in their behaviour, which in turn suggests an active role of an 'invisible hand' of perspective planning as ingrained in the public action that has brought forth this infrastructure development. That is, the development Kerala has

achieved is by no means an outcome of the whims and fancies of the pressure groups. Notwithstanding the apparently disparate and fragmented and scattered organised demands and their public provision, there has run an organic link among their historical dialectics, giving rise to a singular forward-looking public agenda for a conscious collective action. It should be noted that in the case of the three economic infrastructures showing random behaviour, there was no consistently as strong a public demand or an economic compulsion on political initiatives, (except, perhaps, for the corruption factor in irrigation and electricity), as felt for the other infrastructures. Such non-demanding situations result in political rituals of random investment decisions. On the other hand, the social infrastructures commanded the prime priority in investment under much stronger public action, with externalities flowing to the complementary economic infrastructures such as transport/roads; and communication/telephone/post office and banking benefited under economic compulsions from emigration and globalisation. The point is that in these infrastructures, the self-interested motivations for public action, though disparate and fragmented, were consistently so strong and sustained as to put a pattern into their cumulative collectivity.

8. Causality Analysis

Given this result, it is then naturally expected that the infrastructure development in Kerala has also been consistent with her growing standard of living. As we have already discussed, infrastructure development contributes to per capita income (proxied for standard of living in the construction of HDI) through the 'new growth' production function: given physical capital and labor, it is infrastructure that determines standard of living. Hence in this section we attempt to examine this proposition: whether infrastructure growth has *prima facie* (that is, other things remaining the same) caused standard of living growth or not. Here we dispense with the more common Granger non-causality test, in view of its sensitivity to the number of lagged terms included in the model and of the arbitrariness in the choice of the number of lags. Other regression techniques also fall from our favour on account of the costly data mining associated with the possible non-stationarity of the variables.

Rather, here we innovate a *prima facie* (probabilistic) causality test procedure in the Markov chain framework: instead of analysing the states of nature of a single variable in its temporal contiguity, we consider those of two variables in a cause-effect or lead-lag relationship in the Markov chain model. We assume that the previous period infrastructure change (I_{t-1}) causes or leads the present period per capita income change (Y_t); that is, $Y_t = f(I_{t-1})$,[16] instead of the usual Markovian $I_t = f(I_{t-1})$, that we have considered above. Analogous to the state transition probability of the Markov chain, here we have 'causal

[16] Thus we assume only a one-period lag effect. Since we are interested only in *prima facie* (that is, *ceteris paribus*) causality, however, this is not a major limitation.

state transition probability'; that is, P_{ij} now stands for the probability of the 'causal transition' of the *i*th state of the previous period infrastructure change into the *j*th state of the present period per capita income change. In other words, it is the conditional probability $P(Y_t \mid I_{t-1})$. Thus, with two states of nature, as earlier, of positive change (growth, indexed by 1) and non-positive change (indexed by 0), we have P_{11} as the (short run) probability that the previous period infrastructure growth contributes to the present period per capita income growth. Similar definition holds for other three probabilities.

The central idea of probabilistic causality is that cause raises the probability of its effect and is formally expressed as the conditional probability exceeding the unconditional or mean probability. Using the above notations, then the event I_{t-1} is said to be a *prima facie* cause of the event Y_t if and only if $P(Y_t \mid I_{t-1}) > P(Y_t)$ in the respective state of nature, where $P(Y_t) > 0$, keeping the assumption of the temporal order of the events *a la* Hume (Suppes 1970: 12). Note that it refers to only a *prima facie* cause, that is, cause raises the probability of its effect *ceteris paribus*. It should be emphasised here that "'measures of association' is the term commonly used in the statistical literature for measures of causal relationship" required by this definition (Suppes 1970: 13). In this sense, the above definition holds Y_t and I_{t-1} as positively associated; if the inequality is reversed, they are negatively correlated. If equality holds, then the two are probabilistically independent. Another argument requires that a causal relationship make the associated event probable, such that I_{t-1} causes Y_t if $P(Y_t \mid I_{t-1}) > 0.5$ (Papineau 1985: 57ff). In the context of Markov chain, note that the conditional probability, $P(Y_t \mid I_{t-1})$, is the causal state transition probability, P_{ij}, and the mean probability, $P(Y_t)$, the long run probability of the per capita income growth. In short, if $P_{11} > P(1)$, then previous period infrastructure growth *prima facie* causes present period per capita income growth; similarly, $P_{00} > P(0)$ for the case of decline.

Analogous to the infrastructure indices, we make use of an index of per capita income: per capita state domestic product at constant (1993-94) prices of Kerala relative to that of India. The first two panels of Fig. 17 show the relative indicator and the index and by Table 2 (penultimate row) we find that the short run behaviour of the per capita income index changes (Y_t) is just random, and the apparent declining trend is not at all significant. With such random behaviour, causality results would be expectedly meaningless. And Table 3 reports so. The four causal transition probabilities for all the cases of infrastructure indices turn out to be statistically insignificant from one another (that is, from 0.5), suggesting no pattern in their short run association with the behaviour of per capita income index changes. Hence there is no point in considering the causality test results. However, note that P_{00}[17] $> P(0) = 0.564$[18] in a very few cases only. (We consider this case only,

[17] In Table 3 for all indices.

[18] In Table 2 for per capita income (penultimate row).

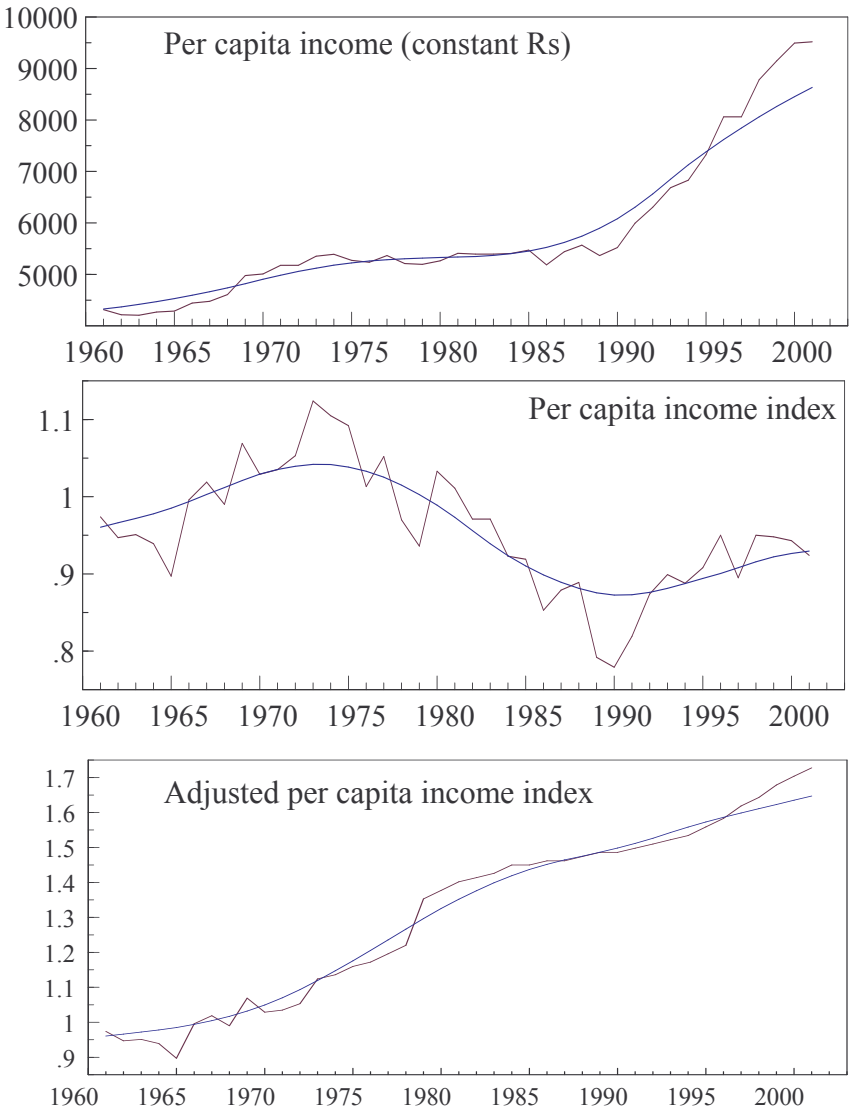

Fig. 17: Per capita income

because $P(0) > P(1)$ (for per capita income in Table 2), but see the two are not statistically different, and $P_{00} > P_{11}$ in Table 3 in general.)

This result of insignificant association (*prima facie* non-causality) between the growth behaviour of the infrastructure and per capita income indices of Kerala is in line with the general argument based on the notion of the 'Kerala model' that stands to highlight a weak economic base, measured in terms of low per capita income. As we have already explained, the official percapita income figures of Kerala being an underestimate, this

Table 3: *Prima facie* causality –
Probability of previous period infrastructure growth contributing to current period per capita income growth [$P(Y_t \mid I_{t-1})$]

Relative Indices	P_{00}	P_{01}	P_{10}	P_{11}	χ^2-value
Infrastructure	0.522	0.478	0.625	0.375	1.04
Economic Infrastructure	0.538	0.462	0.615	0.385	0.85
Irrigation	0.529	0.471	0.591	0.409	0.79
Banking	0.542	0.458	0.6	0.4	0.77
Electricity	0.5	0.5	0.632	0.368	1.32
Transport	0.593	0.407	0.5	0.5	0.93
Roads	0.56	0.44	0.571	0.429	0.65
Rail Routes	0.6	0.4	0.5	0.5	1
Communication	0.5	0.5	0.593	0.407	0.93
Telephone	0.561	0.439	0.538	0.462	0.85
Post Offices	0.526	0.474	0.6	0.4	0.85
Social Infrastructure	0.519	0.481	0.5	0.5	1.19
Education	0.563	0.438	0.565	0.435	0.64
Schools	0.524	0.476	0.611	0.389	0.94
Teacher-Pupils Ratio	0.5	0.5	0.619	0.381	1.19
Health	0.522	0.478	0.429	0.571	1.98
Medical Institutions	0.543	0.457	0.52	0.48	1.18
Hospital Beds	0.537	0.463	0.4	0.6	2.06

indicator is highly unreliable and hence unrepresentative of the standard of living of the Keralites, reflected in their consumption expenditure. However, the argument puts up the small size of the per capita consumption expenditure as incomparable with that of the advanced countries having comparable human development indicators. What has been missed here is the crucial point that it is the *growth* not level that matters, the latter having distinct historical, social and cultural specificities. Per capita consumption of Kerala relative to all-India has been consistently above unity since 1977-78 and still growing over time (at an average growth rate of 1.5 per cent per year) without any rural-urban disparity. What distinguishes Kerala further is that she could sustain a higher growth rate (at about 11 percent per year at current prices) on a much higher level basis than all-India. We also need to take into account in this respect the implications of the high savings rate of Kerala (more than 45 percent at current prices, also see Kannan and Hari 2002: Table 5). This rate implies an adequate consumption level commensurate with the norm and limits specific to the historical, social and cultural life of Kerala. And her high human development just corresponds to *this high* standard of living.

Hence the growth behaviour of the relative per capita consumption expenditure appears to be a better proxy for that of the standard of living of Kerala. We therefore construct a new index, an adjusted per capita income index, with the per capita income index, as used above, made to follow the growth behaviour of the per capita consumption expenditure

index of Kerala (that is, per capita consumption expenditure of Kerala relative to all-India) since 1977-78 and is presented in the lower (third) panel of Fig. 17. We have here an upward rising trend in contrast to the apparently falling cyclical one of the per capita income index. And in Table 2 (last row) we find that this index has had a statistically significant growing trend in the movement of its annual changes in both short and long run. It has had a cumulative growth.

Now we proceed with the *prima facie* causality test, as above, of each of the infrastructure indices with this new index. And in Table 4 we see that the causal transition probabilities are significantly different from each other (or from 0.5) for all but, expectedly, the 'random behaving' three indices of irrigation, rail routes, and electricity. This suggests, as we know, there is a pattern in the co-movements in the annual changes of the concerned indices with one period lag. That is, the co-movement, implying causality, is cumulative. This is further confirmed by the results on the *prima facie* causality (Table 4): in all these well-behaving cases, we have $P_{11} > P(1) = 0.718$ (from Table 2, last row). The presence of I_{t-1} does raise the probability of Y_t^{adj}. Thus there is a positive association between the movements of the

Table 4: *Prima facie* causality –
Probability of previous period infrastructure growth contributing to current period adjusted per capita income growth [$P(Y_t^{adj} \mid I_{t-1})$]

Relative Indices	P_{00}	P_{01}	P_{10}	P_{11}	χ^2-value
Infrastructure	0.688	0.312	0.261	0.739	7.51**
Economic Infrastructure	0.623	0.377	0.231	0.769	6.85**
Irrigation	0.461	0.539	0.583	0.417	3.19
Banking	0.665	0.335	0.269	0.731	7.17**
Electricity	0.414	0.586	0.506	0.494	2.86
Transport	0.71	0.29	0.222	0.778	12.67**
Roads	0.659	0.341	0.24	0.76	10.05**
Rail Routes	0.389	0.611	0.426	0.574	4.58
Communication	0.703	0.297	0.165	0.835	16.04**
Telephone	0.692	0.308	0.115	0.885	17.31**
Post Offices	0.651	0.349	0.281	0.719	4.64*
Social Infrastructure	0.657	0.343	0.222	0.778	11.27**
Education	0.688	0.312	0.087	0.913	17.95**
Schools	0.665	0.335	0.238	0.762	9.32**
Teacher-Pupils Ratio	0.622	0.378	0.095	0.905	17.32**
Health	0.678	0.322	0.143	0.857	16.27**
Medical Institutions	0.641	0.359	0.24	0.76	10.05**
Hospital Beds	0.611	0.389	0.15	0.85	16.17**

Notes: Chi-squared value (for 2 df): 0.05 = 5.991; 0.10 = 4.605.
** = Significant at 5 percent level; * = significant at 10 percent level.

one-period lagged infrastructure index changes and the adjusted per capita income index changes. Also note that $P_{00} > P(0) = 0.282$, confirming the positive association. However, we need to consider the first case only, since $P_{11} > P_{00}$.

Thus we can safely conclude that the infrastructure development temporally did contribute to the growth of the standard of living in Kerala, both severally and in aggregate, though there were a few outliers on account of inadequate public action. In so far as human development is intimately integrated with infrastructure development and standard of living with economic growth, this conclusion may be restated in terms of human development temporally contributing to economic growth. This in turn raises the possibility that we check also for the reverse causality. In fact, there is enough evidence, as we have seen, that the human development Kerala achieved has not only firmed up but also been improving enormously over the years. No doubt, this has been made possible by the ever-growing standard of living. Thus Kerala today presents a variety of a unique organic system of interactive development forces – a sort of cumulative causation through what we call a 'chain interaction': human development $\rightarrow$ economic growth $\rightarrow$ further human development….. Hence we turn to exploring for some statistical evidence on possible reverse causality, standard of living temporally (previous period adjusted per capita income index changes, Y_{t-1}^{adj}) contributing to infrastructure development (current infrastructure index changes, I_t).

Table 5 reports the results with the official per capita income index; as expected, the causal transition probabilities are all statistically equal and may be treated as indicating random behaviour of the concerned index pairs. However, with the adjusted per capita income index, we have some significant results (Table 6). We find positive association between economic growth and infrastructure development in aggregate as well as in economic and social groups. Among the economic infrastructures, only banking and communication/telephone experience reverse causality from economic growth. Among the social infrastructures, however, all the four component as well as the two group indices obtain linkages from it, yielding statistical support to our proposition of chain interaction between human development and economic growth.

7.1 The Concerns and Constraints

Infrastructure Development vs. Industrialisation

It is generally said that Kerala is in the grip of a low investment syndrome thanks to irresistible labour militancy and inadequate economic infrastructures, for example, power. The former stands to mark a higher stage in the historical development of the economic and political consciousness of the labour, which in-itself is valuable, though Kerala is often

Table 5: *Prima facie* causality –
Previous period per capita income growth contributing to current period infrastructure growth [$P(I_t \mid Y_{t-1})$]

Relative Indices	P_{00}	P_{01}	P_{10}	P_{11}	χ^2-value
Infrastructure	0.5	0.5	0.647	0.353	1.47
Economic Infrastructure	0.591	0.409	0.676	0.324	3.61
Irrigation	0.364	0.636	0.471	0.529	1.7
Banking	0.636	0.364	0.529	0.471	1.7
Electricity	0.5	0.5	0.529	0.471	0.06
Transport	0.636	0.364	0.624	0.376	3.75
Roads	0.591	0.409	0.665	0.335	2.49
Rail Routes	0.545	0.455	0.606	0.394	3.06
Communication	0.382	0.618	0.412	0.588	4.44
Telephone	0.373	0.627	0.353	0.647	4.02
Post Offices	0.364	0.636	0.588	0.412	2.17
Social Infrastructure	0.455	0.545	0.588	0.412	0.71
Education	0.318	0.682	0.529	0.471	2.97
Schools	0.591	0.409	0.471	0.529	0.79
Teacher-Pupils Ratio	0.409	0.591	0.529	0.471	0.79
Health	0.5	0.5	0.471	0.529	0.06
Medical Institutions	0.409	0.591	0.344	0.656	3.41
Hospital Beds	0.5	0.5	0.529	0.471	0.06

Table 6: *Prima facie* causality –
Probability of previous period adjusted per capita income growth contributing to current period infrastructure growth [$P(I_t \mid Y_{t-1}^{adj})$]

Relative Indices	P_{00}	P_{01}	P_{10}	P_{11}	χ^2-value
Infrastructure	0.633	0.367	0.452	0.548	4.79*
Economic Infrastructure	0.655	0.345	0.355	0.645	4.91*
Irrigation	0.611	0.389	0.357	0.643	3.11
Banking	0.675	0.325	0.348	0.652	5.23*
Electricity	0.525	0.475	0.484	0.516	0.53
Transport	0.625	0.375	0.642	0.358	3.76
Roads	0.625	0.375	0.677	0.323	4.4
Rail Routes	0.625	0.375	0.613	0.387	2.08
Communication	0.375	0.625	0.258	0.742	7.76**
Telephone	0.46	0.54	0.258	0.742	7.26**
Post Offices	0.375	0.625	0.484	0.516	0.53
Social Infrastructure	0.65	0.35	0.281	0.719	6.81**
Education	0.622	0.378	0.321	0.679	6.11**
Schools	0.45	0.55	0.448	0.652	5.29*
Teacher-Pupils Ratio	0.52	0.48	0.287	0.713	5.58*
Health	0.375	0.625	0.116	0.884	7.53**
Medical Institutions	0.605	0.385	0.357	0.643	4.88*
Hospital Beds	0.445	0.555	0.286	0.714	7.03**

Notes: Chi-squared value (for 2 df): 0.05 = 5.991; 0.10 = 4.605.
** = Significant at 5 percent level; * = significant at 10 percent level.

unique in the excesses in its instrumental value.[19] Given the ideological and social-cultural tradition of participation through organisation and mobilisation in Kerala,[20] this, however, appears inescapable. On the other hand, the inadequacy of economic infrastructures felt in the State as a constraint on investment initiatives is generally attributed to budgetary discrimination followed for a long time by the governments against them, as a result of prime 'priority and precedence' being given to the development of the social infrastructures. Ingrained in this is a tendency to view economic infrastructures 'as competitive rather than as complementary demands in development planning'.[21] Thus to the extent that a development planning exercise presupposes such a complementarity condition and to the extent that the state was actuated by a development perspective, infrastructure development in the State in general could not be discriminatory.

That Kerala ranks very high in the infrastructure indices among the Indian States itself is an effective counter to the general belief that she has neglected economic infrastructures and focussed much of the resources on the social ones. It indicates that she has fared better in many of the economic infrastructures also along with the social ones. The present analysis of the trend of infrastructure development in Kerala in general also yields supportive evidences.

The bright fields in the economic infrastructures are expectedly communication, transport, and banking. Kerala has had a marked edge over all-India in these infrastructures. No doubt, the primary fuel for the phenomenal growth in communication and banking came from the overseas emigration and added fuel from globalisation. And transport infrastructure has always been a corollary to the social ones also. It is significant to note that the development of these infrastructures is as vital for industrialisation and urbanisation as for the emergence of service sector, but Kerala has risen to the direction of a tertiary economy rather than to an industrial one. Thus in spite of a thriving banking sector, with an annual average growth rate of nearly 20 percent in deposits (since 1988), and a wide transport and communication network, the very high level of savings of the Keralites (to the tune of over 45 percent[22] at current prices) could not be translated into industrial investment in sufficient strength. Was it, as an argument goes, on account of non-accessibility to credit?

Low credit-deposit ratio

Despite the spectacular growth in deposits, the credit-deposit ratio (CDR) of Kerala has been one of the lowest in India. It remains more or less stagnant at 42 percent. It reflects that credit disbursements are not on par with the deposit mobilisation in the State. Note that CDR is a product of the ratio of the number of credit accounts to deposit accounts and

[19] For some case studies in the power sector of Kerala, see Kanna and Pillai (2002: Chapter 5).
[20] See Kannan and Pillai 2003a and b.
[21] Centre for Development Studies/UN 1975 [2000]: 153.
[22] See Kannan and Hari 2002: Table 5.

the ratio of credit amount per account to deposit amount per account. While the first of these ratios of Kerala (ratio of the number of credit accounts to deposit accounts) is one of the highest in India, the second ratio (ratio of credit amount per account to deposit amount per account) is much lower, because the credit amount per account of Kerala is one of the lowest in India, though the deposit amount per account is comparable with the all-India level.[23] The low credit amount per account in turn indicates credit deployment in favour of 'small' customers such as in small-scale/mini industries, and for housing and vehicle loans. Evidently large industries are left out;[24] and the causes are worth analysing: either there is no demand from large industries or the banking sector prefers only the small creditors, may be because of risk factors.

Power famine

Still another argument highlights the inadequate supply of other infrastructures, for example, electricity.

It should be noted that unlike other economic infrastructures such as banking and communication, electricity infrastructure as well as irrigation and road infrastructures in India had in their development policy a strong element of social welfare orientation over considerations of profits or returns. Thus these economic infrastructures in their development policies were in effect akin to social infrastructures. Unlike in the latter, however, a consistently cumulative public action prodded by organised public demand was conspicuously absent or weak in the sectors of irrigation and electricity, and hence, the development of these infrastructures in Kerala was erratic. Road development, on the other hand, was more or less ensured in line with the public action for the development of social infrastructures. The economic factors that largely accounted for the development of other economic infrastructures also failed to ignite a development trend in irrigation and power. Much worse, these two sectors were the fertile field for the weeds of the political economy of corruption as we see below.

That the priority and precedence accorded to the social services in resource allocation have adversely affected the development of economic infrastructures and thus of the industrial base in the State can easily be countered on the basis of experiences in these two sectors. It is found that the government has in fact been over-spending on each of the projects undertaken in irrigation and power sectors. Each project has involved immense cost overrun.[25] Had the government been able to implement each project efficiently within the normally expected constraints of time and cost, then it could have saved huge resources and hence undertaken a large number of additional projects. An estimate puts the cost overruns involved in 18 power projects in Kerala at Rs. 6835 million, that is, about Rs. 380

[23] Government of Kerala 2002: 359.
[24] *Ibid.*
[25] See for details Kannan and Pillai (2002: Chapter 5).

million per project![26] This is of very significance in the present context of arguments by the government in favour of private sector participation, under the pretext of a resources crunch. It is not that the government has no resources meant for infrastructure development, because it is actually over-spending; the problem is in the inefficiency of management, coupled with the political economy of corruption. Besides the usual 'sales' procedures of construction contracts and materials purchase orders carried out by means of a collusion between the government and the bureaucracy in the utility, favouring certain contractors, the practice of allowing for time overruns of projects and sanctioning the associated cost escalations involves a 'wide spectrum collusion' among the political party in power (i.e., government), bureaucracy, contractors and trade unions. It is significant to note here that corruption and nepotism in terms of the 'sales' procedures of educational institutions also have a no less significant role in the spread of education facilities in the State. But for the corruption in time and cost overruns, the irrigation and power sectors of the State might also have such a beneficial proliferation of projects!

Despite the sluggish growth of the power sector, the State has been offering a wide range of incentives designed to boost industrialisation, including cheap power and tax holidays. And given the edge Kerala has in terms of infrastructure development in general, the explanation for the failure of industrialisation of the State must be sought for elsewhere. It may be that a comparative advantage might have driven the State economy in its historical advance to skip a stage and grow on services.

Public sanitation

The personal and home cleanliness notwithstanding, environmental hygiene in terms of solid and liquid waste disposal, drainage and community sanitation has increasingly been at an *avoidable* loss in Kerala. The state government admits that

> "[a]t present, the quality of services related to solid waste collection and disposal is extremely poor…It is estimated that only about 50 percent of the 2500 tonnes of waste generated per day is collected for disposal. Everyday a quantity of about 1200 tonnes of waste is left to decompose on road margins, drains, canals, water bodies and open space. Such a situation provides ideal breeding ground for pathogens and germ carriers. Even more serious is the problem of ground water pollution due to leachate from disposal sites. Wind blown debris and burning of wastes invariably cause air pollution. There is a sharp increase in the presence of substances like plastics which are difficult to degrade or break down in the waste stream."[27]

[26] Kannan and Pillai (2002: Chapter 5, Table 2). See Table 7 for project-wise details.
[27] Government of Kerala 2004: 171.

It is found in an analysis of the composition of solid wastes that it contains 68 percent biodegradable wastes and 32 percent non-biodegrdables such as plastic, bottles, metal parts, rubber, bricks etc.,[28] causing serious environmental concerns. Though some of the local bodies have ensured to some extent sanitary latrine facilities to the poor, most of them appear to have failed in obligations on environmental sanitation. There is no practice of processing of segregation and storage of waste at source and this has resulted in a disorganised and ad hoc primary collection system. Moreover, multiple handling of waste in different stages and irregular street sweeping have contributed to inefficient waste transfer and littering. This coupled with the inadequately equipped primary collection points has in turn led to the unfortunate practice of waste dumping along roadsides and open space.[29]

Another threat is posed by bio-medical waste in the wake of the emergence of diseases like AIDS and Hepatitis. It is approximately estimated that the solid and liquid waste generated per hospital bed is about 1.3 to 2 kg and 450 litres respectively; about 15 percent of this is infectious and toxic wastes and the remaining, general wastes.[30] Very often the two types of wastes are handled together in hospitals such that they mix and the general wastes also become toxic. With an ineffective safe disposal mechanism, this accumulates into a major health hazard of menacing proportion. The wastes are often dumped in the hospital backyards (even in some of the medical colleges) and along the nearby road margins. Though the waste generator is in general held accountable for the safe treatment and disposal of the wastes, it is the responsibility of the local bodies to treat and dispose of the treated bio-medical waste as well as the general hospital waste. The Kerala State Pollution Control Board is the prescribed authority to see to it that this be done as per the Bio-medical Waste (Management and Handling) Rules, 1998; but there has never been an instance of intervention against any erring hospital or local body, despite the rotting accumulation of wastes – another instance of bad governance.

9. The Prospects

That Kerala ranks very high in the infrastructure indices among the Indian States itself is an effective counter to the general belief that she has neglected economic infrastructures and focussed much of the resources on the social ones. It indicates that she has fared better in many of the economic infrastructures also along with the social ones. The present analysis of the temporal trend of infrastructure development in Kerala in general also yields supportive evidences. We have found that the relative indicator of aggregate infrastructure development of Kerala has over the last four decades been consistently above the all-India one, the index always being above unity, though with a declining trend. Still significantly, it is the behaviour of the economic infrastructure index that has mapped

[28] *Ibid.*
[29] *Op. cit.*: 172.
[30] *Op. cit.*:176.

the behaviour of the aggregate index. The former has also been consistently above unity, but with a declining trend.

On the other hand, the social infrastructure index has been cyclically moving above unity, under the combined influence of education and health sub indices. Remember both the sub-indices have been above unity, the former with a rising cyclical trend and the latter having completed a half-cycle with a long downswing. The rising trend of the education index emanates from the TPR index. It should be noted that the school and medical institutions density indices have had similar temporal behaviour of describing a peak and the subsequent fall, while their capacity utilisation (TPR and hospital beds) indices have had opposite trends. The falling hospital beds sub-index explains the long downswing of the health index, though both being comfortably above unity.

There have been some disquieting trends in the social sectors of Kerala for some time. These largely correspond to an increasing societal inclination towards private sector provisions of education and health care in the name of quality. It should at the same time be remembered that there has since long been a strong (that is, predominant) presence of private sector in both these infrastructures. School enrolment has had a declining trend in Kerala for the last 15 years thanks to the sharp fall in the rate of growth of school-going population. There was a fall of 8.05 lakh students in total school enrolment in Kerala (a decline of 13.6 percent) during the period 1992 – 2002. However, the enrolment of students in private unaided schools shows an increasing trend (about 70 percent increase) during the period (Government of Kerala 2002: 235). The sharp enrolment decline in the public and private aided sectors has given rise to a new problem of increasing number of 'uneconomic' schools and 'protected' teachers. As per Kerala Education Rules, a school becomes 'uneconomic' if its minimum strength of students per standard in LP/UP/HS is below 25. Financing the schooling in such context is said to be 'simply nonviable' (Government of Kerala 2002: 238) and this warrants government decision to close down that school. This concept, highly unjustifiable as it weighs down schooling on economic scale, facilitates the growing tendency of the governments to shirk the social responsibility for the provision of universal education. We should not, however, be blind to the need for relocating the students and teachers of such so-called 'nonviable' schools to another one for guaranteeing against waste, *provided* accessibility is ensured. At the same time there is an urgent need for stemming the erosion of quality of schooling and thus the tide into the unaided sector, as the two sectors stand to generate two unequal grades of future citizens with dangerous implications. Similar situation exists in the health care sector of Kerala also. It is in this light should we consider the recent government moves to institute a mechanism of user charges for its social provisions that would effectively result in the exclusion of the vulnerable population and in a retrogression in what Kerala has so far achieved.

Coming back to the economic infrastructures, let us recap that Kerala has done equally well, if not better, in many of these sectors also. The notables are expectedly communication, transport, and banking. Kerala has had a marked edge over all-India in

these infrastructures; though Kerala is losing her momentum relative to India in respect of the transport indicator and apparently[31] in banking, she appears to be still far ahead. No doubt, the primary fuel for the phenomenal growth in communication and banking came from the overseas emigration and added fuel from globalisation. And transport infrastructure has always been a corollary to the social ones also. It is significant to note that the development of these infrastructures is as vital for industrialisation and urbanisation as for the emergence of service sector, but Kerala has risen to the direction of a tertiary economy rather than to an industrial one. Thus in spite of a thriving banking sector, with an annual average growth rate of nearly 20 percent in deposits (since 1988), and a wide transport and communication network, the very high level of savings of the Keralites (to the tune of over 45 percent) could not be translated into industrial investment in sufficient strength. Was it, as the general argument goes, due to the inadequate supply of other infrastructures, for example, electricity?

It should be noted that unlike other economic infrastructures such as banking and communication, electricity infrastructure in India had in its development policy a strong element of social welfare orientation over considerations of profits or returns, while irrigation and road infrastructures were independent of such considerations. Thus these economic infrastructures in their development policies were in effect akin to social infrastructures. Unlike in the latter, however, a consistently cumulative public action prodded by organised public demand was conspicuously absent or weak in the sectors of irrigation and electricity, and hence, as our results have indicated, the development of these infrastructures in Kerala was erratic. Road development, on the other hand, was more or less ensured in line with the public action for the development of social infrastructures. The economic factors that largely accounted for the development of other economic infrastructures also failed to ignite a development trend in irrigation and power. Much worse, these two sectors were the fertile field for the weeds of the political economy of corruption (see Kannan and Pillai 2002).

That the priority and precedence accorded to the social services in resource allocation have adversely affected the development of economic infrastructures and thus of the industrial base in the State can easily be countered on the basis of experiences in these two sectors. It is found that the government has in fact been over-spending on each of the projects undertaken in irrigation and power sectors. Each project has involved immense cost overrun.[32] Had the government been able to implement each project efficiently within the normally expected constraints of time and cost, then it could have saved huge resources and hence undertaken a large number of additional projects. An estimate puts the cost overruns involved in 18 power projects in Kerala at Rs. 683.5 crores, that is, about Rs. 38 crores per project! (Kannan and Pillai 2002: Chapter 5, Table 2). This is of very significance in the present context of arguments by the government in favour of private sector participation, under the pretext of a resources crunch. It is not that the government

[31] Because the negative trend of the banking index is not statistically significant.
[32] See for details Kannan and Pillai (2002: Chapter 5).

has no resources meant for infrastructure development, because it is actually over-spending; the problem is in the inefficiency of management, coupled with the political economy of corruption. Besides the usual 'sales' procedures of construction contracts and materials purchase orders carried out by means of a collusion between the government and the bureaucracy in the utility, favouring certain contractors, the practice of allowing for time overruns of projects and sanctioning the associated cost escalations involves a 'wide spectrum collusion' among the political party in power (i.e., government), bureaucracy, contractors and trade unions. It is significant to note here that corruption and nepotism in terms of the 'sales' procedures of educational institutions also have a no less significant role in the spread of education facilities in the State. But for the corruption in time and cost overruns, the irrigation and power sectors of the State might also have such a beneficial proliferation of projects!

Despite the sluggish growth of the power sector, the State has been offering a wide range of incentives designed to boost industrialisation, including cheap power and tax holidays. And given the edge Kerala has in terms of infrastructure development in general, the explanation for the failure of industrialisation of the State must be sought for elsewhere. It may be that a comparative advantage might have driven the State economy in its historical advance to skip a stage and grow on services.

10. Quality and Freedom

Development is the process of enhancing freedom, expanding capability set, opportunities and choices "so that each person can lead a life of respect and value." (UNDP 2000: 2). In other words, "Development consists of the removal of various types of unfreedoms that leave people with little choice and little opportunity of exercising their reasoned agency." (Sen 1999: xii). The list of freedom includes the civil and political freedoms, economic facilities, social opportunities including entitlement to education and health care services, transparency guarantees involving freedom to deal with others openly, and finally, protective security guaranteed by social safety nets (Sen 1999: 38–40). Also included in the list are honest governments, open legislative and transparent regulatory systems and effective and impartial legal system, with protection of and support for rights, physical infrastructure such as energy, roads, transportation and telecommunications (Sen and Wolfensohn 1999). And as we have seen, Kerala has to her credit a remarkable record of "the removal of substantial unfreedoms" that "is *constitutive* of development." (*ibid*.) especially in respect of 'social opportunities' and 'physical infrastructure'.

It should be noted that development as freedom from deprivation consists in realising both availability (including accessibility) and utilisability (or simply, utility) of those the public provision of which constitutes freedom from deprivation. In other words, realisation of development implies that in its truest sense of this duality. Then the right to development, being a human right, *is* a right to *both*; even with availability, development is denied and unfreedoms exist if utility is denied. Following the reinterpretation (for example, by

Lancaster 1971) of the traditional theory of demand for commodities as a demand for *characteristics* of commodities, the demand for development may be seen as a demand for characteristics or *quality* of commodities, the public provision of which constitutes freedom from deprivation. In this light, mere availability sans quality fails the purpose of public action and thus development. For example, a badly corrugated road, or an unreliable electricity connection, or an uncomfortable public transportation or an unbecoming school or hospital by no means represents development, though each apparently augments the vector of capability. Such *quasi* capability enhancement in quantitative terms sans utilisability which we call '*q-capability enhancement*', however, is of neither intrinsic nor instrumental value. A school that issues certificates but imparts no intellectual light generates no value. An untreadable road is only a waste of a natural resource. An electricity connection that spawns blackouts and brownouts is only a source of irritation and disutility. It is in fact quality or utility that lends both intrinsic and instrumental values to capability. And it is for its value that a capability and hence development is desired and demanded.

It is now possible to distinguish between *quasi* development (*q-development*, corresponding to q-capability enhancement) and undevelopment (on account of stark deprivation). Since development is desired for its value and the value is valued in terms of utility, the right to development is also a right to quality. Where quality provision is denied, there is denied freedom, development. To this extent then unquality is undevelopment, but the corresponding q-capability enhancement stands to qualify this undevelopment. It should be noted that q-capability enhancement is a cut above deprivation and is of much shorter gap from development. As quality is attained, the apparentness disappears. Such development constrained by unquality is hence only a q-development. An irritatingly unreliable electricity connection is a q-development; and so is an unapproachable road or an unbecoming hospital. In all these cases we have q-capability enhancement and hence q-development only. Thus there is an unfreedom in unquality that puts a constraint on the realisation of freedom or development in its truest sense of the duality of availability and quality. That is, unquality represents an unfreedom in freedom. Only the removal of this constraint then constitutes development. This is the stage of what we call *freedom from quasi-freedom* that is development in its truest sense of realising its duality of availability and utility.

This light casts doubt on the claims of Kerala in respect of both social and economic infrastructure development. Quality is an issue of serious concern in these fields: roads and transportation, electricity, education, public health, to mention some. Once discounted for quality, this 'development' boils down to mere q-capability enhancement, and thus to q-development. For one example, Kerala completed cent percent rural electrification long back, and even put up an air of an energy exporter for quite some time in the past, but since the early 1980s she has been reeling under severe power famine. Though 70.24 percent of the households in Kerala are at present electrified, the reliability of electricity connection is far from satisfactory, with very frequent and long spell of blackouts and brownouts. It goes without saying that Kerala's electrification is only a q-capability enhancement. Similarly,

Kerala does have a high edge over all-India in connectivity among communities via roads, but most of the roads are in bad condition and are still as narrow as earlier due to long neglect of upkeep, despite the phenomenal increase in the number of vehicles on the roads. Combine with this the poorly maintained public transportation, and the common man in Kerala stands to achieve his social contacts at a very high indirect cost – another example of q-capability enhancement.

Perhaps a better and widespread recognition of quality problems of infrastructure in Kerala is in the field of education. Outdated syllabi and poor quality teaching leave little light for the learner here. No wonder in the lacklustre performance of the Kerala students in all-India competitive examinations. As we have already seen, the sharp increase in the enrollment in the private unaided schools, along with a decline in the case of government and private aided schools, is a reflection of the recognition of this problem. Where quality matters substitution takes place, with private sector viewed as competitive in quality. Thus demand for quality gets reflected in demand for private sector provision, wherever it is available. Such substitution is strong in the health sector also. It may be argued in this line that had there been opportunities, substitution would have a substantial role in the power sector also. The widespread use of stabilisers, inverters and gen-sets across Kerala as a reflection of the quality problem in the supply of power might be an indicator of the tendency for such a substitution. That private sector provision is qualitatively superior is supported by the general economic logic of *quid pro quo*, that a price ensures and enforces quality. These threads of argument are both baseless and dangerous. Baseless because conveniently forgotten here is the fact that there is no free lunch: behind every public provision, there is a price in the form of taxes from the public and this price should have ensured and enforced quality as much as it does in private provision. Dangerous because it props up an unwarranted bias for private sector where there is an explicit provision for exclusion.

Thus it goes without saying that structure of provision has nothing to do with quality: public provision has as much economic space for quality as private one. The problem is in enforcement. There is a compulsive demand for quality as far as private provision is concerned. But this simply lacks in the public one under the false impression of a seeming free lunch. This in turn suggests that it is imperfect information that matters here. The public remain just unaware of their right to development in its true sense and thus of their right to quality. Development is never a dole of a 'charity state', but a commitment of a state as a duty bearer. It is what the tax income from the public must be translated into. In other words, it is the development in its dual sense of availability *and* quality that the public *must* purchase for their taxes. With this light come incentives that work behind a compulsive demand for true development that is to colour the corresponding public action. It is here that an informed platform gains significance to institute itself as a force of social reform to raise a civic society, conscious of the rights. Kerala is fortunate in having had such a platform, strong though fragmented, for a long period that has been instrumental in

bringing in so much a-capability enhancement. But history cannot stop here. The question is: Can Kerala achieve the true development, the *freedom from quasi-freedom*?

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